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Deuxième préface au volume vingt neuf

L'histoire de la science et l'organisation internationale

AVANT-PROPOS

L'article qui suit est une communication faite au Congrès mondial des Associations internationales, Deuxième session : Gand-Bruxelles, 15-18 *juin* 1913. *Il fut publié dans les Actes du congrès, Documents préliminaires n°* 37, 14 *p.,* 1913-06*; puis une seconde fois dans la* Vie Internationale *(vol.* 4, *p.* 27-40, *Bruxelles,* 1913*), la belle et généreuse « revue mensuelle des idées, des faits et des organismes internationaux » créée en* 1912 *par* Henri La Fontaine *et* Paul Otlet. *Deux années plus tard la guerre mondiale se déclanchait...*

Quelle chute vertigineuse ! Et cependant cette calamité elle-même confirmait ce que La Fontaine, Otlet *et d'autres n'avaient cessé de répéter. Le monde est désormais organisé sur une base internationale ; cette organisation est si complète et si profonde qu'il est impossible de s'en dépêtrer, et les calamités aussi bien que les bénédictions tendent à devenir œcuméniques. Jamais une guerre n'avait été aussi complètement internationale ; elle avait envahi tous les continents, toutes les mers, — toute la planète. Les malheurs de l'après-guerre furent partagés par tout le monde de la même manière, et vainqueurs et vaincus durent boire le calice jusqu'à la lie. Peut-être n'en ont-ils pas encore bu la portion la plus amère...*

Il est certain que nous traversons en ce moment une période de désorganisation politique comparable à celle de l'époque napoléonienne, mais empirée d'une part par les immenses progrès techniques et d'autre part par l'interdépendance internationale qui a envahi tous les domaines. Avons-nous

atteint le nadir de cette dépression politique ou faut-il que l'humanité subisse une autre guerre, plus terrible encore que la précédente? Il serait vain de prophétiser à ce sujet, et d'autant plus qu'une nouvelle guerre pourrait être déclanchée beaucoup plus facilement que l'ancienne : les apprêts sont à la fois plus formidables et plus explosifs, et le plus terrible de tout, c'est que cette guerre, qui affecterait le sort de millions d'hommes, pourrait être précipitée à tout moment par un ou deux individus irresponsables et sans scrupules.

Dans ces conditions la publication d'une nouvelle édition de mon pamphlet de 1913 *peut paraître une gageure. Je crois qu'au moment où les malheurs des temps découragent tant de bonnes volontés, il est plus nécessaire que jamais de réaffirmer nos convictions. Bien entendu si j'avais à écrire cet article aujourd'hui, je l'écrirais différemment, car j'ai plus d'expérience qu'il y a vingt-cinq ans. J'ai été fort tenté d'y apporter quelques corrections, mais il m'a semblé qu'il valait mieux le reproduire tel quel.*

L'idée centrale c'est que l'histoire de la science, c'est vraiment l'histoire de l'humanité dans ce qu'elle a d'essentiel et de plus noble. C'est une histoire qui intéresse tous les peuples et toutes les races, et dont personne n'aura jamais à rougir. La gloire de l'humanité c'est notre gloire à tous.

Il importe aujourd'hui plus que jamais d'expliquer aux enfants des hommes ce qui les unit, plutôt que ce qui les sépare les uns des autres ; il faut les aider à comprendre la genèse et le développement de leur patrimoine commun, qui est aussi la partie la plus précieuse, et de beaucoup, de tout leur héritage.

Les hommes de génie qui nous aident à découvrir la vérité comme ceux qui augmentent notre patrimoine de beauté et de justice, accomplissent la plus haute fonction humaine. Bon gré, mal gré, ils ne l'accomplissent pas pour eux seuls, ni pour leur famille, ni pour leurs amis, ni pour leur patrie, ni pour leur église, mais pour toute l'humanité.

New York, 6 avril 1938. GEORGE SARTON

Le mouvement d'organisation intense auquel notre temps nous fait assister, est vraiment admirable : c'est un spectacle passionnant entre tous, et je me félicite souvant d'être né assez tôt, pour pouvoir le contempler et y collaborer. Car il y a peut-être quelque chose de plus beau et de plus grand que l'harmonie déjà réalisée, ce sont les efforts des hommes pour l'établir.

On n'a pas encore assez fait remarquer que ce mouvement est essentiellement un mouvement d'ordre scientifique, car il ne consiste en rien d'autre que dans l'application des méthodes scientifiques à des domaines de la vie pratique et de la vie sociale, où ne régnaient jusqu'ici que l'empirisme et le hasard. Il s'agit de remplacer partout une politique myope, étroite, mesquine, sans esprit de suite, par une politique, faite comme l'autre bien entendu de réajustements continuels, mais du moins soutenue par un idéal, appuyée sur un plan d'ensemble, ayant égard non pas à des économies et des avantages locaux et momentanés, mais à des économies et des progrès durables et internationaux. Voici une image frappante qui vous permettra de mieux vous rendre compte de la différence de ces deux politiques : comparez une ville médiévale, aux rues tortueuses, bizarres et parsemées de détritus de toute sorte et les villes de l'avenir, celle de Canberra, par exemple, dont on vient seulement de construire la première colonne, mais dont tout le plan et toute l'économie sont dès à présent fixés, du moins dans leurs grandes lignes. Les amis du pittoresque s'obstineront peut-être à préférer la première, comme il leur est loisible de préférer aussi, dans leur inconscience, les plumes d'oies, les diligences, les passeports et les épidémies; mais toute personne sensée et vraiment altruiste, reconnaîtra qu'il faut s'efforcer avant tout d'assurer au maximum d'individus, une existence saine et heureuse, où les besognes purement matérielles soient réduites le plus possible. Il serait facile d'ailleurs de montrer que les cités nouvelles, et leurs environs, ne le céderont aucunement en pittoresque aux villes et aux faubourgs de jadis.

Il ne faudrait pas s'imaginer toutefois, que ce mouvement d'organisation soit une chose nouvelle. Il n'en est rien, car on pourrait prétendre qu'il est aussi vieux que la science elle-même. Sans doute, depuis quelques années, il a pris une forme plus systématique, et nous avons vu apparaître une profession nouvelle; celle des *organisateurs internationaux*; mais ceux-ci ne s'imaginent

pas avoir créé le mouvement. (1) Bien au contraire, si ces organisateurs devaient apparaître, s'ils sont apparus en réalité, c'est que le mouvement d'organisation avait déjà pris une telle extension, et était devenu si complexe, que l'existence de « spécialistes » s'imposait. L'apparition de ces professionnels de l'organisation internationale n'en est pas moins un événement important, car c'est depuis ce moment que le mouvement d'organisation est devenu vraiment conscient et méthodique.

Il serait du plus haut intérêt d'écrire l'histoire de ces tendances organisatrices, jaillies de tous les domaines de l'activité humaine, qui ont préparé et amené lentement le splendide mouvement actuel; aucune œuvre ne serait actuellement plus opportune que celle-là. Elle apporterait, en effet, à ce mouvement, auquel on reproche quelquefois d'être un peu squelettique, la matière vivante qui lui manque encore; l'armature est prête, mais il manque la chair et le sang. L'histoire de l'organisation, en révélant les racines profondes par lesquelles celle-ci se rattache à toute la vie de l'humanité, en mettant en évidence toute l'expérience humaine immense dont elle n'est que le résultat inconscient, assurerait au mouvement son unité de pensée et d'action, et augmenterait considérablement sa force attractive. Le mouvement internationaliste ne serait plus seulement un programme admirable, mais un peu sec et un peu froid; il apparaîtrait à tous comme la conclusion logique et irrésistible et la leçon suprême d'un long passé d'efforts et de tâtonnements. Cette histoire donnerait au mouvement internationaliste, une base idéologique plus profonde et plus solide, et contribuerait ainsi puissamment à sa diffusion et à sa réalisation.

Ces tendances organisatrices se sont manifestées d'abord dans le domaine de la science, et c'est là encore que l'organisation internationale se retrouve et peut être étudiée sous sa forme la plus simple, la plus pure et la plus parfaite. Et cela n'est point étonnant. Le mouvement d'organisation étant, comme je l'ai dit, un mouvement d'ordre scientifique, au premier chef, il était à prévoir qu'il s'épanouirait tout d'abord dans ce milieu

(1) Ce sont d'autres personnes qui leur prêtent ces idées saugrenues : elles prouvent ainsi qu'elles n'ont rien compris, elles-mêmes, au mouvement internationaliste.

préadapté pour s'étendre ensuite de proche en proche à mesure que le permettraient les conquêtes de la science et du bon sens humains. C'est ainsi que l'organisation internationale de la science est arrivée aujourd'hui à un haut degré de perfection; il suffit de songer à toutes les sociétés, les commissions, les conférences, à tous les congrès et bureaux internationaux, qui se sont distribués l'investigation systématique de la nature.

Mais il y avait encore d'autres raisons que celle que je viens d'indiquer, pour que la science fût organisée avant les autres domaines de l'activité humaine. Sans doute, celle que j'ai donnée est la raison essentielle : le mouvement d'organisation devait s'appliquer avant tout à la science parce qu'il en sortait; c'était un besoin interne de la science qui agrandissait son champ d'action, ou, pour parler en termes concis, ce n'est pas l'organisation qui domine la science, c'est la science qui domine et oriente l'organisation. Mais voici les autres raisons, qui sont aussi d'un grand poids. On sait qu'une des caractéristiques de la science, c'est l'objectivité de plus en plus complète, de plus en plus profonde à laquelle elle vise. Le savant est exercé à faire abstraction de ses préférences personnelles. Il en résulte que le milieu scientifique est moins passionné, moins encombré de préjugés, plus favorable aux innovations de toutes espèces : la voie est débarrassée de tous les obstacles que les passions et les intérêts individuels accumulent dans d'autres directions.

Il faut tenir compte aussi de ce fait que les savants ressentent peut-être plus directement et plus intensément que les autres hommes, le besoin et les avantages de l'entr'aide internationale : il leur arrive constamment d'utiliser des résultats obtenus par des hommes de toutes les nationalités et de voir leurs propres travaux, commentés, amplifiés, améliorés par des collaborateurs répartis dans tout le monde civilisé. Il est donc naturel, que pour rendre cette entr'aide — qui est une condition essentielle du progrès scientifique, — plus effective et plus efficace, ils se soient depuis longtemps préoccupés d'unifier leurs méthodes et leur terminologie, et de centraliser leurs résultats. Or, c'est en cela précisément que consiste l'organisation internationale.

De plus, c'est la science qui inspire les idées philosophiques, voire même les conceptions religieuses, dans la mesure où celles-ci sont évoluables, et les théories morales. On peut dire sans aucune

exagération, que l'idéologie d'une époque est dominée tout entière par la connaissance des forces naturelles, à laquelle elle a pu se hisser. Bien entendu, cela ne signifie point que tous les contemporains subissent immédiatement et simultanément l'influence des théories scientifiques nouvelles : au contraire, ils ne subissent cette influence, que tour à tour, chacun selon ses mérites intellectuels, à la suite d'un véritable processus de diffusion (2), mais *tous* la subissent, plus ou moins, et à chaque moment de l'évolution, sans qu'ils s'en rendent toujours compte, les hommes pensent et agissent en conformité avec la science devenue classique.

D'ailleurs, s'il est vrai de dire que tous les hommes ne sont pas influencés simultanément par les mêmes idées scientifiques, et que celles-ci n'apparaissent pas à eux tous, avec la même clarté et la même précision, il faut remarquer toutefois qu'à mesure que la civilisation se perfectionne, la pénétration et la diffusion des idées se font de plus en plus vite, le réajustement continuel des idées philosophiques et morales sur les idées scientifiques s'accélère constamment, et les usages de la vie pratique retardent de moins en moins sur la science. Il s'ensuit que pratiquement, la grande majorité des hommes instruits ont les mêmes racines intellectuelles, je veux dire que leurs diverses idéologies reposent sur la même base scientifique. En ce sens on peut affirmer *que la science est la pensée commune de la Terre* : elle constitue l'ensemble des faits et des idées, dont tout arbitraire a été exclu, qui ont entraîné le consentement unanime, et sont placés hors de discussion.

Ceci fait apparaître le caractère tout à fait particulier du domaine scientifique, au point de vue de l'organisation internationale : la science classique est le domaine privilégié de l'internationalisme, parce qu'elle est le bien commun de tous les hommes, parce qu'elle est, par son essence même, commune et internationale. (3)

Et si la science est vraiment le fonds commun (j'ai failli écrire : le plus grand commun diviseur) de tous les peuples civilisés vivant à la même époque, si elle est vraiment la base profonde sur laquelle sont edifiées toutes les constructions idéologiques et techniques de notre temps, ne sera-t-il pas permis d'en conclure que l'histoire de la science est l'histoire des origines de la culture

(2) Cette comparaison très juste est empruntée à OSTWALD.

(3) Je me suis déjà exprimé plus longuement sur cette question dans mon essai sur l'Histoire de la science, *Isis* 1, p. 43, Wondelgem, 1913.

humaine ? Prenez garde, ceci n'est pas une vérité évidente; du moins, ce n'est pas une vérité superficielle. Mais quiconque voudra se donner la peine de faire tout au long le raisonnement que je me borne à esquisser ici, ne manquera pas de la découvrir. *La science nous donne les principes et les méthodes fondamentales de la civilisation et de l'organisation humaines ; l'histoire de la science est donc vraiment une histoire des origines de la culture et du progrès humains.*

C'est assez dire que la nécessité d'étudier l'histoire de la science s'impose impérieusement à tous ceux qui s'occupent d'organiser la civilisation de leur temps : ce n'est qu'ainsi qu'ils pourront donner à leur activité la base philosophique qui lui fait trop souvent défaut, et qu'ils assureront en même temps à leurs efforts le maximum de convergence et d'efficacité.

Je puis revenir maintenant à une idée que j'exprimais tout à l'heure : je disais qu'il serait extrêmement intéressant de dégager l'histoire des tendances qui ont lentement amené ce mouvement d'organisation consciente à laquelle nous avons la joie d'assister et de collaborer en ce moment. Mais n'est-il pas devenu évident, que l'histoire de la science nous fournirait vraiment la partie essentielle de cette étude, — qu'elle en serait en quelque sorte le cœur et l'âme, et lui donnerait sa signification profonde ? De plus, c'est l'histoire sublime de la pensée humaine qui communiquerait à cette étude son caractère idéaliste, donc aussi *sa force motrice ;* car il est bien certain que c'est notre idéal seulement qui nous rend capables de faire de grandes choses, qui nous inspire la force de persuasion nécessaire, et nous permet de disposer en notre faveur les puissances du bien.

Au surplus, même si ces préoccupations organisatrices n'existaient point — je fais là une hypothèse absurde, puisqu'elles sont une conséquence inévitable de la civilisation, — n'y aurait-il pas encore un immense intérêt à inventorier avec soin cette pensée commune, qui est le plus précieux trésor que nos ancêtres nous ont légué ? Cette pensée commune, cet héritage indivisible et inaliénable, ne constitue-t-il point la noblesse de l'humanité, et sa gloire ? Et puisque ce trésor de science sera éternellement leur propriété commune, n'est-il pas évident que rien ne doit contribuer davantage à faire se rapprocher, s'aimer et s'aider les hommes, que l'étude de sa genèse et de son évolution ?

La place me manque pour donner ici quelques exemples, qui n'auraient de portée réelle que s'ils étaient exposés assez longuement, mais il suffit de lire l'histoire complète d'une découverte quelconque pour être obligé de reconnaître deux choses remarquables :

1° C'est que les sciences sont inextricablement enchevêtrées et ne cessent de réagir les unes sur les autres; les progrès des unes dépendent étroitement des progrès réalisés par les autres. Il en résulte qu'il n'y a en vérité, qu'une seule science, malgré la diversité des méthodes. Si intéressante que soit cette constatation en elle-même, nous ne pouvons l'utiliser en ce moment, et je me borne à la signaler en passant.

2° Mais la seconde constatation nous conduit au contraire, au cœur même de notre sujet : C'est qu'aucune découverte n'a été l'œuvre d'un individu isolé. Bien plus, je crois pouvoir affirmer qu'aucune n'a été entièrement réalisée par des individus d'une seule nationalité ou d'une seule race. On peut en conclure que l'élaboration de la science et de la technique n'est pas une œuvre personnelle, ni nationale, mais simplement une œuvre humaine. C'est l'humanité tout entière qui invente et qui progresse. Si l'on remarque de plus que les découvertes sont très souvent simultanées, il faut bien en conclure qu'elles ne peuvent être dues au hasard : de telles coïncidences, si fréquemment renouvelées, seraient tellement improbables, qu'il faut bien admettre qu'elles sont déterminées (4). L'histoire de la science est donc dominée en partie par un déterminisme social : l'intervention du hasard, ou si l'on veut de l'inspiration et du génie est circonscrite. Or, ce déterminisme social n'est en somme qu'un aspect de l'enchevêtrement des actions et des pensées humaines, et de leurs réactions innombrables. Il nous révèle, sous une forme saisissante, l'entr'aide et l'étroite collaboration humaines. Et ma comparaison de tout à l'heure en acquiert une signification plus profonde : c'est l'humanité tout entière — unifiée par l'enchevêtrement et l'interdépendance infinis des activités individuelles, — qui invente et qui progresse. Tout le travail intellectuel de l'humanité est

(4) Cf. à ce sujet : MENTRÉ, Sur la simultanéité des découvertes scientifiques. *Rapports et comptes rendus du deuxième Congrès international de Philosophie*, Genève, 1905, p. 916-24.

comme le travail d'un être unique, infatigable et immortel. Il faut bien se garder de mal interpréter ce déterminisme de l'invention. Voici un exemple d'interprétation trop étroite (5) : si l'on pouvait réunir des exemplaires de tous les modèles d'un instrument ou d'une machine quelconques, depuis les plus primitifs jusqu'aux plus perfectionnés, il est très probable que l'on pourrait les ranger tous en une série continue, de telle sorte que chacun des modèles ne différerait que très peu de ses voisins. On aurait ainsi une collection ayant beaucoup d'analogies avec celles des naturalistes qui, en alignant des échantillons d'espèces infiniment voisines, nous permettent de concevoir une transformation d'une espèce en une autre, par des transitions insensibles. Mais il serait tout à fait abusif d'en conclure, dans les deux cas, mais plus encore dans le premier, que l'ordre de création de ces différents spécimens est précisément celui qui est indiqué par le classement. Il arrive très souvent que des modèles moins perfectionnés que des modèles déjà existants soient imaginés à nouveau. De même, la nature nous donne de nombreux exemples de régression.

Mais ce qu'on peut dire, c'est qu'à mesure que l'organisation humaine se précise et se perfectionne, et que la documentation devient plus centralisée, plus complète et plus rapide, le déterminisme social des découvertes s'accentue : il semble toutefois, qu'il ne pourra jamais envahir tout à fait le domaine de la liberté et du génie individuels.

Il apparaît assez clairement en tous cas, que les jalousies et les rivalités stupides et mesquines, qui troublent si souvent les relations réciproques des individus et des nations, correspondent à une méconnaissance profonde de la réalité des choses. Il est bien inutile de les qualifier autrement. Sans doute, il y aura toujours des esprits égoïstes, étroits et bas; nous nous garderons bien de les juger, mais du moins faut-il empêcher qu'ils n'influencent les autres et que leurs préoccupations jalouses et mesquines ne prédominent. Or, le meilleur moyen d'y remédier, n'est-ce pas de retracer le plus exactement possible la genèse et l'évolution de la science et de la technique humaines, et de montrer ainsi les liens intellectuels innombrables qui unissent les hommes

(5) Cf. Fr. Galton, *Natural inheritance*, p. 33.

entre eux ? C'est à quoi les Associations Internationales pourraient s'employer de diverses manières : tout d'abord en enrayant toutes ces tentatives de discorde et de haine, lorsqu'elles se produisent dans leur propre sein, ensuite, en s'entendant entr'elles pour rendre unanimement hommage aux génies de la science, quelles que soient leur origine et leur race. De nombreuses occasions leur sont données d'agir dans cette direction : ainsi, presque chaque année, l'un ou l'autre pays se propose de fêter le 100e ou 200e... anniversaire de la naissance d'un homme illustre. Il appartiendrait aux Associations Internationales d'étendre la portée de ces fêtes, de les rendre plus belles et plus grandes en invitant le monde civilisé tout entier à y participer. L'an prochain, par exemple, l'Allemagne fêtera le centenaire de la naissance de ROBERT MAYER. Mais celui-ci n'est pas seulement un héros national, il est plus : c'est un héros de la science humaine. Ce n'est pas l'Allemagne seule qui a tiré parti de ses découvertes, et celles-ci, d'ailleurs, ne sont point sorties tout entières du sol de l'Allemagne; elles sont sorties du cerveau de l'humanité. Il ne faut donc pas que ces fêtes jubilaires soient l'occasion d'une explosion nouvelle d'orgueil et d'égoïsme nationaux; il faut, au contraire, qu'elles resserrent un lien nouveau entre les peuples; c'est à toute l'humanité cultivée, qu'il appartient de fêter le souvenir de cette naissance heureuse qui accéléra le progrès humain.

De même, les Associations Internationales, chacune d'elles dans son champ propre, et toutes ensemble, pour tout le domaine de la pensée humaine, pourraient se donner pour tâche de pourchasser sans trêve toutes les erreurs intéressées ou inconscientes, dont sont remplies tant d'histoires et d'encyclopédies nationales et qui servent d'aliments à toutes les rancunes, à toutes les jalousies, à tous les préjugés de race. Ce serait vraiment là une belle et noble tâche, l'accomplissement d'un grand devoir humain, et je puis l'ajouter, chacun des collaborateurs y trouverait l'occasion de remplir ses devoirs patriotiques. Car aucune « patrie » ne serait diminuée; toutes ont collaboré au progrès humain; toutes seraient grandies et ennoblies par la justice qu'elles se seraient rendue mutuellement. A quoi leur sert-il, d'ailleurs, de s'attribuer l'honneur de découvertes qu'elles n'ont point faites, ou qu'elles n'ont faites qu'en partie ? Diminuer l'honneur des autres patries pour la sienne, n'est ce point plutôt la trahir que la bien servir ?

Il est certain qu'aucune institution n'aurait plus d'autorité pour régler toutes les querelles de priorité, et plus généralement pour faire admettre les conclusions de recherches historiques désintéressées que les Associations Internationales. Et rien non plus ne consoliderait davantage l'unité et l'autorité morale de ces Associations, que la célébration des souvenirs communs, et la conservation de ce patrimoine de gloire qu'aucune patrie ne peut revendiquer entièrement et qui leur appartient à toutes.

Je conclus donc que les Associations Internationales devraient toutes, inscrire à leur programme d'action, la nécessité : 1° de créer des archives historiques, qui seraient en quelque sorte les fastes internationaux de leur discipline; 2° de dénoncer, en toutes occasions, les erreurs intéressées ou non, dont sont encore remplis tant d'ouvrages et de journaux, relativement à l'histoire de la science et de la technologie; 3° de préparer, pour leurs réunions, la célébration de fêtes commémoratives destinées à rendre hommage aux bienfaiteurs de l'humanité, et d'inviter tous leurs membres à y prendre part pour s'unir dans une même pensée de reconnaissance.

En s'efforçant ainsi de déraciner les préjugés et les antipathies de race, et d'introduire plus de vérité et de justice dans l'appréciation des mérites d'autrui et dans la répartition des plus hautes récompenses dont l'humanité dispose, je veux dire : la reconnaissance unanime des gens compétents, les Associations Internationales feraient faire à l'organisation de notre vie morale un progrès immense.

Elles contribueraient puissamment à faire comprendre aux hommes, qu'au point de vue purement scientifique, il n'est plus admissible de parler d'une « culture nationale ». Sans doute, il est permis, et il le sera toujours, de parler d'une culture nationale pour tout ce qui relève de l'émotion et de la sensibilité : car dans ce domaine, c'est la nature même qui est la principale inspiratrice, et quoique fassent les hommes, celle-ci restera toujours infiniment diverse. Ce sont ces qualités, qui relèvent de la sensibilité, qui donnent à une même civilisation humaine un aspect et un charme special dans chaque région de la terre. Et il est utile, pour donner plus de variété et de charme à la vie, que ces différences existent. Nous ne songerions pas plus à supprimer ou à atténuer ces différences de sentir, que nous ne voudrions que l'on nous changeât

les arbres ou les fleurs, voire même les pierres du pays où nous sommes nés. Mais pour ce qui concerne le domaine soumis à l'investigation scientifique, je répète que c'est un contre-sens de parler d'une culture nationale. Il est vrai que la science s'épanouit avec plus d'abondance et de vigueur dans certains pays que dans d'autres, mais c'est tout ce qu'on peut dire. Cette science n'est pas pour cela spéciale à ce pays. La science appartient à tous ceux qui se l'assimilent; elle trouve ses inspirateurs et ses imitateurs dans tous les coins du monde où l'homme pense. Il n'y a pas de science allemande ou française; il n'y a qu'une science humaine. Sans doute, il y a des laboratoires français, allemands, anglais..., mais les travaux qui en sortent sont les résultats d'efforts innombrables de savants de toutes les nationalités, et les découvertes qui y sont faites vont immédiatement s'ajouter au patrimoine international de la pensée humaine. Aucun savant ne songerait à réserver à son pays la connaissance d'une découverte qu'il vient de faire. Tous aspirent, au contraire, à la soumettre le plus vite possible, au jugement de leurs confrères disséminés dans tout le monde civilisé. De même, peu importe la langue : il est tout à fait absurde par exemple, de prétendre que la science est allemande ou française, parce que la proportion de mémoires rédigés en allemand ou en français est prépondérante. Car la langue dans laquelle un mémoire scientifique est écrit est une qualité toute superficielle : il y a beaucoup de mémoires publiés en français ou en anglais par exemple, qui sont presque entièrement inspirés par des travaux d'autres pays. Il n'est pas indifférent il est vrai, que ces mémoires soient bien ou mal rédigés, et que les résultats soient présentés avec plus ou moins d'élégance. Mais le style, dans son acception la plus haute, est indépendant de la langue véhiculaire : le style n'est pas une qualité littéraire, c'est une qualité d'âme.

Il importe de remarquer que cet internationalisme de la science ne s'étend pas seulement à la communication de faits précis et d'idées générales; il est beaucoup plus profond. Et peut-être même, s'approfondit-il plus encore qu'il ne se généralise; car, à mesure que l'organisation internationale se perfectionne, on ne se borne plus à échanger des livres, mais on échange des méthodes vivantes, des habitudes de penser et de comprendre : les congrès, les conférences, les échanges de professeurs, les missions, les

laboratoires internationaux où des savants de tous les pays travaillent en commun, dans un coude à coude continuel, sont les principaux facteurs de cette internationalisation intense à laquelle nous assistons dans tous les centres de la culture humaine.

L'histoire de la science et de l'organisation, complétée par le spectacle de l'organisation sociale actuelle, nous révèle les tendances générales de l'évolution et nous donne ainsi la démonstration la meilleure de l'internationalisme humain.

Car remarquez-le bien, il est tout à fait inutile de prêcher l'internationalisme aux hommes : s'ils ne sont pas mûrs pour atteindre à ces idées d'eux-mêmes, s'ils ne sont pas encore capables de regarder avec sympathie au delà des frontières de leur pays, ils ne comprendront pas non plus les discours qu'on leur fera. Il ne faut pas prêcher l'internationalisme, il faut le montrer à l'œuvre. Les Associations Internationales ne diront pas à leurs membres : « Voilà ce qu'il faut faire, voilà les sentiments qui doivent vous animer ». Non ! Elles diront simplement : « Voilà comment les choses se sont passées; voilà d'après toutes les données historiques que nous avons réunies, et d'après le spectacle que vous pouvez voir de vos propres yeux, l'évolution qui nous entraîne; voilà quelle est l'anatomie de la société d'hier et de celle d'aujourd'hui, et selon toutes probabilités, voilà quelle sera celle de demain... ». Cet internationalisme qui se réalise aujourd'hui, morceau par morceau, avec une accélération croissante, c'était le rêve de tous les grands penseurs de l'humanité... : aujourd'hui, la Grande Patrie et la Paix Universelle ne sont plus des rêves, ce sont des réalités qui grandissent trop lentement sans doute, mais qui ne cessent de grandir, ce sont des choses tangibles.

Et c'est parce que ces rêves sont devenus des réalités ou du moins ont reçu un commencement de réalisation, que j'attache relativement moins d'importance à la propagande pacifiste *abstraite*. Non pas que je considère cette propagande comme inutile, loin de là ! — elle rend l'autre propagande, la vraie, la propagande des faits et des habitudes, plus consciente, — mais je pense que l'efficacité et le rendement utile de ces efforts sont relativement minimes. L'internationalisme et le pacifisme se développeront toujours beaucoup moins par les considérations morales et philosophiques que par la *leçon des faits*, le spectacle de l'évolution : il faut montrer l'internationalisme et le pacifisme en action,

malgré toutes les mauvaises volontés, malgré toutes les railleries, malgré toutes les tendances séparatrices et chauvines, malgré tous les égoïsmes individuels et collectifs.

De même que je me plairais à faire voir à un égoïste qui ferait étalage de son égoïsme (comme les nations font étalage de leur égoïsme national), que son égoïsme est impuissant, qu'il ne peut accomplir un acte social sans déclancher aussitôt mille obligations qui le lient malgré lui à ses semblables, qu'il ne peut prendre part à la civilisation sans y collaborer (c'est ainsi, par exemple, que les pays sauvages sont entraînés dans le courant général de la civilisation, par des gens qui le plus souvent ne s'y rendent que pour gagner le plus d'argent possible aux dépens des indigènes, mais qui ne peuvent s'empêcher de leur apporter en même temps des idées et des façons de vivre nouvelles : tels les insectes qui servent à la fécondation des fleurs et réalisent l'œuvre de l'avenir, sans le vouloir et sans le savoir, n'étant préoccupés que des fins égoïstes qu'ils poursuivent); de même, plutôt que d'exposer aux nations les raisons qu'elles ont de s'unir, il faut leur faire voir et leur faire sentir les liens qui les unissent déjà et qui sont les conditions essentielles de tous les avantages matériels et intellectuels dont elles jouissent; plutôt que de leur prêcher la paix, il faut leur montrer toutes les forces anonymes et inconscientes qui travaillent sans cesse à l'établir, malgré les états-majors, malgré les fabricants de canons et de blindages, malgré les fournisseurs d'armées, malgré les aventuriers de toute sorte qui attendent leur salut de la guerre.

Il faut faire voir que la solidarité devient de plus en plus un besoin organique de notre vie sociale, qu'il y a une solidarité mécanique, automatique qui croît avec la multiplicité et la précision des liens sociaux.

Par les efforts inconscients de tous les hommes qui travaillent en paix, et par les efforts conscients de quelques organisateurs, peu à peu les haines et les jalousies de race s'atténuent et se transforment, et une solidarité plus haute et plus étendue s'édifie lentement au-dessus de nos instincts et de nos devoirs patriotiques, de même que dans le passé, la Patrie s'est élevée peu à peu au-dessus de la Famille.

Il appartient aux Associations Internationales de guider et de précipiter cette évolution, en contribuant par les moyens que j'ai

indiqués, à la rendre plus consciente, et en s'efforçant de faire pénétrer les idées-forces de l'Internationalisme dans l'idéologie humaine.

En résumé, les Associations Internationales ont pour devoir de contribuer à l'amélioration des relations internationales. Et le mieux qu'elles puissent faire pour accomplir ce devoir, c'est de mettre en évidence les liens innombrables qui unissent les savants de tous les pays, en vulgarisant une connaissance aussi exacte et aussi complète que possible de l'histoire de la science et de l'organisation humaines. Elles rendront la collaboration et l'entr'aide internationales plus sensibles encore, en organisant des fêtes jubilaires internationales pour commémorer le souvenir des conquêtes de la science et célébrer la naissance des grands hommes.

(Wondelgem 1913*)* GEORGE SARTON.

A study of the Kerotakis Process as given by Zosimus and later alchemical writers

Chapter I

EGYPTIAN ALCHEMY AS GIVEN BY ZOSIMUS

1. Introductory

Since 1888 when Berthelot gave us the Greek text and French translation of the works ascribed to Zosimus and others, very little study has been made of the Egyptian alchemistic methods.

There are reasons for this neglect,—one being the almost hopeless character of the text, intentionally obscured by the writers " in order to conceal the thought from the vulgar and uneducated ". (1)

Another reason is found in the fact that many of the " vulgar and uneducated " in ages past, in valiant but unsuccessful attempts to understand the methods, have added their own interpolations to the text, thereby increasing the difficulties of the modern scholar.

If we can improve our vague notions of the theories of Zosimus, fundamental to those of Islamic and of Latin alchemy, our study of these dependent forms will be placed upon a firmer foundation. In discussing Zosimus, it is not sufficient to conceal our ignorance by hiding behind the acknowledged mysticism of those early days. There may be a genuine thought, mystical and chemical, which has so far eluded our grasp.

In Zosimus, we have an author of many theses written in Greek, which would form a very valuable compendium of Egyptian alchemy, except for certain difficulties : (1) the authorship of

(1) This is illustrated by an expression of the (later) el-Habib : " For gold,

some of these theses appearing in the ZOSIMUS collection is doubtful or known to be false; and (2) ZOSIMUS' reverence for the men of olden times has allowed him to present with apparently equal weight, statements and theories of the primitive artisan, with his superficial tinting, side by side with the vigorous writings of MARY, the somewhat mythical inventor of the Kerotakis process. (2)

I have attempted to eliminate from the writings ascribed to ZOSIMUS by BERTHELOT, such passages as have to do with the primitve art (which does not concern us), and also of course the superstitions and religious ecstasies of ZOSIMUS, and in doing so, I have become more and more impressed with the thought that what remained *has turned out to be the Kerotakis method of Mary.* This method I have examined and the results are included in the present paper.

The so-called " Kerotakis method " followed the standard Egyptian method with its four steps; and these remained undisturbed, as a unit, since the innovation offered at first only a substitute for the four-metal black alloy of the first step.

Since frequent reference will have to be made in this paper to the " orthodox " Egyptian process, I am prefixing the following chart and notes as a memory-aid.

Chart of the Steps in the Orthodox Process.

IV. Iosis. " Gold " to violet, "Ios,"—with reproductive power.

III. Xanthosis, " Silver " to yellow; " Gold."

II. Leukosis. Black to white; " Silver."

I. Melanosis. Production of a black metal—tetrasomy.

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it is necessary that the mercury be what is called ' Mercury from cinnabar,' but as for me, I have called it Sulphur."

(2) The Egyptian alchemistic technique derives from these methods of superficial bronzing; and these again probably from the art of the dyeing of fabrics. Now SYNESIUS presents a legend that these superficial effects were introduced from Persia by OSTANES. But the coloring of metals " through and through " was known to the Egyptians very early. Such metals or alloys so colored, white or yellow, were accepted by the early Egyptians as silver or gold. (BERTHELOT, *Collection des anciens Alchimistes Grecs,* II, III, 7.)

NOTES ON THE ORTHODOX PROCESS.

1. The names and colors of the metals are interchangeable in Egypt. Gold was the yellow metal; silver, white; copper, red; and *conversely*. When the surface of copper was touched with mercury, it became superficially silver, for white was silver.
2. The color of a metal was important, for it was considered spiritual. It was the "Spirit of the metal," independent of the inactive Body—the matter serving as a support for the active spirit. The individuality of the metal and all its reactive force was due to the spirit.

   In the *Iosis*, this spiritual color became so concentrated that it was nearly free from the retarding influence of the body. Here occurs, for the first time in the history of alchemy, the vision of a spirit or sperm of such productive power that it could transmute the lower metals into unlimited quantities of the purest gold. Commenting on this thought, BERTHELOT (3) states, "In other words, if you possess a material in which the color-quality resides in the manner of a [concentrated dye-extract], you have the philosophers' stone [the Ios] and you can then tint into gold and produce true gold." Likewise OLYMPIODORUS (4): "It is evident that, at first, the metals were volatile [spiritual] because they had found nothing which could fix them; but when they had reached complete stability, the indelible nature of the tincture brought them to the present state of metals."
3. The production, in step I, of an alloy with no individualizing qualities (especially color) to serve as the matter to be transmuted, was considered a great advance over the use of any single metal, like copper, clouded with interfering colors. The absence of all color (black) became the *sine qua non* of metallic transmutation.
4. In steps II and III, we have two illustrations of the process called transmutation.

   In leukosis, the alloy superficially black was changed to white

(3) BERTHELOT, *op. cit.* III, VI, 10, note 4 (p. 134).
(4) BERTHELOT, *op. cit.* II, IV, 15.

(silver) by treatment with " mercury " and a " ferment of silver."

In xanthosis, the silver, thus produced, was fused and tinted with some yellowing material and a " ferment of gold."

5. It was in these two steps that there was introduced the important theory of the " occult color." At the end of the leukosis, the silver, when fused, appeared silvery but the yellow gleam of gold was seen on the inside. This was interpreted to mean that the second step had been complete—but more, that some gold also had been formed. Then the difficult third step became easier; for the gold ferment gathered to itself first the " occult " gold, forming a nucleus, and then to this was attracted all the gold produced in the third step (5).
6. Something of the same idea is indicated in the final Iosis, but not clearly stated. Thus we have in BERTHELOT, *op. cit.* III, XXIX, 3, " the tincture in violet may be recognized by this sign, that it should start deep in the interior [occult]—that which is called the Ios of gold." (6)

2. MARY'S INNOVATION AND THE PRODUCTION OF THE SCORIAE

The substitute for the *tetrasomy* in the first step was a simpler alloy called *molybdocalc* containing only two metals, lead and copper (7), but intentionally blackened to imitate the earlier tetrasomy. This blackening was the first step in the Kerotakis process. The alloy, in leaf form or in small pieces, was suspended on the Kerotakis sieve, in a closed flask containing sulphur—the whole acting like a modern return-condenser or extractor. On heating, the sulphur rose as a vapor, was condensed against the cool head and fell, " the pursuing element" (8) constantly bathing

(5) BERTHELOT, *op. cit.* II, III, 6. " The operation which brings out the hidden nature."

BERTHELOT, *op. cit.* III, XXIX, 11. " In doing this, you will cause the quality [the color] hidden in the interior to come forth. ' In fact,' says MARY, ' transform their very nature and you will find what you wish.' "

See also, II, IV, 48 and III, VI, 20-21.

(6) See also BERTHELOT, *op. cit.* IV, I, 4, quotation given on page 17.

(7) Thus two metals, iron and tin, were rejected as unnecessary.

(8) BERTHELOT, *op. cit.* III, LVI, 3.

the shiny alloy causing it to lose its metallic sheen and changing it to a black sulphide. This black product (scoriae or ashes), though somewhat volatilized and condensed in the head with some sulphur, largely settled to the bottom near the source of the heat and became very *dry*. The Greek word is ξηρίον (xerion) meaning *dry* powder (9). In the meanwhile, the remaining sulphur falling to the hot base was again volatilized and forced to repeat the cycle continually, until the supply of sulphur was exhausted.

These black scoriae of the Kerotakis process were acclaimed by MARY as superior to the tetrasomy which was only superficially black, while her powder was black " through and through." It is easy to see that the whole Kerotakis method was very important. It is sufficient to note that ZOSIMUS accepted it and later writers copied it. ZOSIMUS was so intrigued by MARY's methods that he even quotes her seductive advertisement (see BERTHELOT, *op. cit.*, III, XXIX, 2) " Now, it is impossible that these things be carried out except by means of the apparatus with distillation attachment and the connecting parts," that is to say the alembic fitted with Kerotakis (v. *op. cit.* II, III, 6)—although ZOSIMUS must have known that all the processes had already been carried out in ordinary apparatus (10).

The preparation of the famous scoriae has been described many times. The operator was directed to watch through the glass container the progress of the fascinating transformation, as the volatile spiritual element converted the bright metal alloy, causing it to lose its characteristic lustre and change into something very different, while the metal supposedly " captured the spirit " of the volatile sulphur (11).

And MARY took pity upon the novice, advising in these encouraging words : (BERTHELOT, *op. cit.* II, IV, 48) " Do not be discouraged because of your inexperience, for when you see that the metal has turned to cinder, understand that everything is

(9) But the term *xerion* is usually applied to a product, derived from this original, but more complicated and historically more important (see page 14 of this thesis).

(10) BERTHELOT, *op. cit.* III, XXI, 3. " All the operations which were previously carried out in viols."

(11) BERTHELOT, *op. cit.* II, IV, 37-38. " The metals are reduced to the state of cinders—the ' cinders of Mary,' which the prophets of Egypt desired to know. They are the foundation for the whitening and the yellowing."

going well;" and (BERTHELOT, *op. cit.* III, XXVIII, 7) "When the volatile [sulphur] has taken on a body, conversion has taken place."

The great interest evidently excited by this innovation of MARY may have been due to the facts (1) that the *apparatus with Kerotakis* was new and very convenient; and (2) the method helped to confirm, by a practical illustration, the accepted theory of the supremacy of the *Spirit* overcoming and transforming the *Body* of the metal.

The black scoriae of MARY were apparently at first intended simply as a substitute for the tetrasomy. But we note these differences. While MARY's product was indeed black "through and through," it did not have the metal body of the tetrasomy. The orthodox process transmuted the metal body (with little interference from the superficial black coat) because the reagents called "mercury," especially arsenic, produced a silver mirror upon a leaf of the metal. But in MARY's black product the metal had been wholly transformed to sulphide, which is not affected by the alchemist's reagents.

This probably destroyed any hope that the scoriae of MARY could serve as a substitute for the tetrasomy. But this failure was more than made up when eventually it was discovered that this xerion had the valuable property of acting as a tinting agent. We find it in use as the "permanent ferment" its tinting power being tested against bright silver (12).

More minute study of details of MARY's method discloses that the actual description as given in ZOSIMUS, is at variance with this substitution theory. Assumed very naturally, this supposition has been the cause of much misunderstanding. I have been equally confused with all the others. Now, with a somewhat different point of view, details which seemed complex because contradictory, have become clear by definition (see section 4); and the general rôle of the black xerion has become evident by allowing it to take on its proper complexity.

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(12) "Permanent ferment": HOPKINS, *Alchemy, Child of Greek Philosophy*, (Columbia University Press, 1934) pp. 68, 84 and 107.

"They cast it upon silver": BERTHELOT, *op. cit.* III, XVI, 14, and *La Chimie au Moyen Age*, Tome III, pp. 66, 67, and note 3.

"When it is tinted, it tints": BERTHELOT, *op. cit.* III, XIX, 4.

We have, then, to assume first that the dry powder *after absorbing various reagents*, is to serve as the necessary ferment or catalyst, the effective agent to bring forth the hidden (occult) and higher nature of the metals in steps II and III, and finally to bring out the occult spiritual character in the Iosis.

As we thus venture to transfer the scoriae from the receptive matter to the active agent, this question must be answered: What then was the material, instead of the xerion, which was to be transmuted into gold? And the second assumption must be (the same as in the orthodox process), *a metal;* not a common metal but a combination free from individual metallic properties.

There are two reasons in support of this conclusion:— 1) (to repeat) None of the common Egyptian reagents (such as mercury, arsenic or antimony) reacts with copper sulphide. But on a metal such as copper, each of these elements (known to the Egyptians under the general term "mercury") produces a silvery mirror. 2) There are a few references (which puzzled me for a long time) to the reduction of a portion of the scoriae, after purification, to the metal form; and there are specific statements that the tincture is to be applied to the metal—rather than to the black scoriae (13).

3. Purification of the Scoriae

As has been said, the scoriae were found at the end of the Kerotakis experiment, in two places, some fallen to the bottom of the flask and some volatilized and still clinging to the head of the apparatus. The latter were considered spiritual, because of the volatilization, in contrast with that at the bottom. The presumption was that body and spirit had been separated by the heating process, being originally one.

According to theory, the more balanced and effective state would be where body and spirit would be again combined.

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(13) Berthelot, *op. cit.* III, X, 3 (as given on page 14); also III, XXVIII, 2: "It is the molybdocalc itself [the alloy] which you ought to tint xxx in order that the (future) gold shall exist not only potentially but actually. Thus spoke Mary after having named the *body* of magnesia, bread." (i.e. Something to be fermented).

Practice followed theory and each of the two portions was first thoroughly pulverized to a state close to infinitesimal subdivision and then the volatile portion was mixed intimately with the non-volatile, to give an ideal combination, which as if it were " activated " would absorb the necessary reagents.

The following quotations illustrate these facts :

(BERTHELOT, *op. cit.* III, XXVIII, 11) " You will find [in the lower portion] a black body or ' black lead; ' also often a large quantity of ashes in the upper portion."

(BERTHELOT, *op. cit.* III, LVI, 1) " The sublimed vapors have been so called because they have been carried from the bottom to the top, above the cinders, towards the upper region, the head of the apparatus."

(BERTHELOT, *op. cit.* II, IV, 40) " MARY says : If you do not make the incorporeal corporeal and the corporeal incorporeal; and if from the two bodies you do not make a single substance, nothing expected will be produced."

Explaining : (BERTHELOT, *op. cit.* III, XXVIII, 8) " If the bodies resisting the fire are not mixed with those which sublime before the fire, we obtain nothing which is expected."

(BERTHELOT, *op. cit.*, Texte Grec, III, LVI, 1 & 2) " The scoriae should be removed from the vessel, then pulverized and cast upon the spirits ***from which they were separated***... Experience will teach us the truth and bring us to the accomplishment of the one and perfect work—the finished xerion."

After the pulverizing and " mixing body and spirit," comes the removal of excess sulphur. This is begun by boiling with " water of natron " or " sulphur water," followed by heat with the aid of a blast (14). In another passage, we find " the sulphur ought surely to be removed by blasting " and MARY indicates the loss in weight; (15) and (BERTHELOT, *op. cit.*, Texte Grec, III, XVII, 2) " We call non-substance the sulphurous (combustible) materials not resisting the fire. But liquids make them resist the fire and overcome it. For water is opposed to fire."

(14) BERTHELOT, *op. cit.* III, XI, 4.
(15) BERTHELOT, *op. cit.* III, XII, 2, 3.

Further purification involves the removal of soluble matter by alternate washing with water and fusion (16) (with a note that " water " means " sulphur water.")

Thus the xerion, after careful pulverizing and mixing and purification from excess sulphur and from soluble matter, was ready to be used in the preparation of the two ferments, the white and yellow. (See section 5).

4. The Reagents

The names given to a reagent in alchemy are of little use in identifying it. A number of reagents may be indicated by one name, such as " mercury," sometimes only because they have the same rôle or a like quality; and sometimes avowedly to confuse the novice and to test the " one who has intelligence " enough to catch the idea from the context (17).

Often the same reagent is indicated by a number of names, as will be seen under *arsenic*.

Arsenic

In the second step, the reagent for Whitening is called " Mercury." ***It is our arsenic***, as is stated repeatedly. The effect on the metal copper is the same with either reagent (mercury or arsenic) i.e. superficially a silvery mirror; or in the case of a powder or thin leaf, a silvery amalgam or arsenide, transformed " through and through." In the third step, it is the mercury which comes from cinnabar (HgS) (18).

The word *ἀρσενικόν* in the Greek means our arsenic but it may also mean ***male;*** while antimony *(στίμμι)* is female.

(16) Berthelot, *op. cit.* IV, I, 9. " Wet the xerion with mordant liquids in order that the [future] tincture may be penetrating and fixed.

(17) In Berthelot, *op. cit.* II, III, 6, Synesius mentions a long list of *white* substances in order that his " intelligent " pupil may understand that the topic is Leukosis or Whitening; and in *op. cit.* II, III, 16, when Dioscorus asks : " What signify these words : ' Such are those things which cause bodies to resist the fire, being themselves volatile ? ' " Synesius answers : " In order that the ignorant may think that these things are true."

(18) Berthelot, *op. cit.* II, III, 7 : " In the treatise on gold, it is stated the mercury which comes from cinnabar; and, in the treatise on Whitening, the mercury which comes from arsenic and from sandarac."

Similarly we have two words chrysolith (male) and chrysocole (female) (19).

Chrysolith stands for a solvent formed from white arsenic in alkali (or in lime-water); and the corresponding antimony solution may have been the solvent called chrysocole, i.e. solvent rather than solder (20). SYNESIUS, again, speaks (21) of " the mercury coming from cinnabar " (Hg); and the mercury coming from chrysocole (Sb) and again (18) mercury which comes from Italian antimony... or from arsenic (As_2S_3) or from ceruse (As_2O_3).

The basis for all the work with arsenic is the sulphide, (As_2S_3) occurring naturally in grey crystals; and more particularly its white oxidation product (As_2O_3) which latter we call " white arsenic " but with the alchemists was known either as ***white lead*** (ceruse) or more frequently ***white sulphur*** (meaning the white product of oxidation of the mineral sulphide) or again sulphur incombustible (22).

Sulphur Water

In the Leyden Papyrus X, recipe No. 89, we have directions for preparing " Sulphur water " : " A handful of lime and as much sulphur in fine powder. Warm in vinegar until the solution appears the color of blood. Decant from the residue and use."

This polysulphide of calcium, red after the warming process, can be used in solution for staining the metals and in the dry way will dissolve gold. This was the original " sulphur water." Corresponding were the alkaline or calcium arsenites (23) and antimonites (24)—all included in the general term ***sulphur water***.

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(19) Chrysocole is translated literally *solder of gold* and therefore rendered malachite or basic carbonate of copper, or borax or a number of gold alloys, substances in common use for soldering gold, none of which fit into our alchemistic text.

(20) BERTHELOT, *op. cit.* II, IV, 43. " Chrysolith, which is called the male of chrysocole."

(21) BERTHELOT, *op. cit.* II, III, 7 and 18.

(22) BERTHELOT, *op. cit.* III, XII, 4 : " After separation from its sulphurous body, take the part which colors; for arsenic is the soul of gold-making material."

(23) BERTHELOT, *op. cit.* II, IV, 43 : " The chrysolith, the liquid which begets the gold."

(24) BERTHELOT, *op. cit.* III, XXVIII, 4 : " It is what is called Pyrite (Sb_2S_3). In fact no other stone than pyrite is so beautiful and so loved of God."

It was the arsenite which figured in the second step, leukosis, and again in the third step, xanthosis (25, 26, 27, 28, 29).

5. The silver tincture and the gold tincture

Now, entering the steps of transmutation (Steps II and III) we find that the three reagents called for are the ferment-catalyst, the color, and the arsenicals. The functions of the first two have been already stated but most important of all was the third reagent, the arsenicals with their male fire (30) to which were assigned two functions: 1st, penetration and rapid diffusion, associated with the idea of ordinary poisons; 2nd, substitution for fire, without the destruction caused by fire.

The first, penetration and diffusion, was most important and for this purpose the single agent was the "Chrysolith, the liquid which begets the gold." This poison was supposed to *strike down into the depths of the copper or silver carrying with it the ferment and the tincture*—the ferment gathering together the occult silver or gold and the tincture producing more of each by change of color. Thus the lower metal was transmuted throughout its whole mass, and the effect was insured by the protection of the body of the

(25) Berthelot, *op. cit.* III, XVI, 10: "It is the sulphur water, the great mystery, which appears white, like marble, which whitens everything, even the body of molybdocalc. It is the smoke of burning arsenic [As_2S_3] which fixes the tinctures."

(26) Berthelot, *op. cit.* III, XVI, 11: "Now white sulphur is involved in both steps. Whitening is obtained by white sulphur and the balance of white sulphur is found in the last class that of [colored] liquids; adding golden arsenic."

(27) Berthelot, *op. cit.* III, XVI, 12: "The ceruse has a different power in the silver process than in the gold process i.e. to form gold or purple; or to form white, or silver."

(28) Berthelot, *op. cit.* III, XXVII, 4: The vapor of sulphur whitens everything.

(29) Berthelot, *op. cit.* III, LII, 3: "Without sulphur water there is nothing; all the composition is accomplished by it. It is by this that it is cooked, that it is calcined, that it is fixed. It is by this that it undergoes Iosis, refining and extraction."

(30) Berthelot, *op. cit.* III, XXVIII, 8: "What other substance acts without the aid of fire, if not sulphur water? Pebechius says it is more powerful than any fire and Mary calls it igneous."

Berthelot, *op. cit.* II, IV, 43: "This is the male water which has been called the sphere of fire."

metal itself, " in order that *penetrating into the depths of the metal*, the tinctorial materials may escape the destruction caused by fire " (BERTHELOT, *op. cit.*, III, XII, 4) (See also CRATES, p. 22 of this thesis.)

Thus, the arsenite is often called " the ferment " because, in the solid form, by fusion, it dissolved the " little leaf " of gold (the catalyst) and after this both went into water solution together. " Since a single liquid acts on both silver and gold, therefore the " sulphur water " plays the part of a yeast " (BERTHELOT, *op. cit.*, III, LII, 4) (31).

By the second function of the arsenical, the final gold produced by the transmutation is to be strengthened by the male fire so that it may remain unchanged in the presence of fire (32).

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As has been indicated, the three reagents were used all together. This was theoretically necessary for when penetration and diffusion was initiated by the arsenic solution, just then was needed the catalyst-ferment,—the " little leaf of silver or gold "—to gather to itself all the precious metal supposedly produced; and the color to improve by tincture; and then also the protection of this product against the " destruction caused by fire."

In order to introduce these three as one, the alchemists used the famous (purified) Xerion powder as absorbent for all the three reagents needed, thus making a single, but compound, reagent somewhat in the nature of a Theriac prepared by the apothecary. This introduces into MARY's famous process, a complexity which I think has not been noticed heretofore.

Thus, we find (BERTHELOT, *op. cit.* IV, I, 11) " all these things are prepared before the whitening and the [following] yellowing... in order that the perfect gold be accomplished," and (*op. cit.* III, XXI, 3) after warning that pottery vessels should be discarded in favor of glass, " for fear that they absorb the tincture and the

(31) BERTHELOT, *op. cit.* III, XII, 5 : " The vapor [of the sulphide] is a spirit [As_2O_3] penetrating the body xxx and if one works according to rule, this useful and tincturing thing cannot be destroyed."

(32) BERTHELOT, *op. cit.* III, LVI, 3 : " He instructs them to make the tincture [the new metal] resistant to fire by means of fire."

flower of the tincture," the author says : " Their receptive nature is immediately saturated and colored with the flower of gold; and then the *Scoriae of Copper will no longer absorb* the flower of Iosis."

Particularly indicative is this passage (BERTHELOT, *op. cit.* III, VI, 18) : " The composition starts in *unity* and proceeds as a *triad*, formed from separate elements." (33)

In review, the three preparations gathered together in the triad, ready for union in the xerion, were the following :

I. The " sulphur water " or alkali arsenite, divided into two portions (34).

II. The ferment : silver for one half and gold for the other half—each fused separately in alkaline arsenite and the fused product dissolved in its portion of I.

III. The color : for the first half, elementary arsenic;
for the second half, antimony (mercury) and antimony sulphide.

NOTE : If the reagent were prepared for leukosis, alkaline arsenite would be fused with silver foil and the product dissolved in one of the half-samples of alkaline arsenite solution to which elementary arsenic was added for the silver color. This mixture was absorbed by the xerion which, thus " perfected," served as the *tincture for leukosis or whitening*.

For xanthosis, gold foil was substituted for silver foil and the fused product dissolved in the other half of the arsenic solution to which elementary antimony was added with orange-colored (precipitated) antimony sulphide for color; and the whole absorbed by the dry xerion powder. *This was the famous gold-tincture* —which was also given the name xerion.

(33) The author adding : " And therefore HERMES is called TRISMEGISTUS."
(34) BERTHELOT, *op. cit.* III, XVI, 18 : " The whole by half."

The two tinctures

for

Step II	Step III
I. Arsenic solution containing	I. Arsenic solution containing
II. The silver catalyst-ferment and	II. The gold catalyst-ferment and
III. The color (As-metal)	III. The color (Sb_2S_3)
This triad absorbed by the xerion was used as the *Silver Tincture* on the metallic alloy	This triad absorbed by the xerion was used as the *Gold Tincture* on the silver produced in Step II; and known as the " final and perfect " xerion.

By absorbing the arsenite solution, the purified xerion, though a solid, acquired the great projecting quality usually associated with the idea of poisons. Also, the arsenite solution carried with it the ferment, as well as the tincture, to spread their influence to all of the innermost parts of the metal to be transmuted.

Now (BERTHELOT, *op. cit.* III, X, 3) we find this important passage :

" It is necessary that this [sulphur] water, like a yeast, start the fermentation which will produce the like by means of the like [silver from silver, gold from gold] in the *metal* which is to be tinted. In fact, just as yeast, though in small quantity, ferments a great mass of dough, likewise also this *little portion* of gold

(III, XXI, 3) " perfects all the xerion and makes everything ferment."

NOTE : This implies that the little leaf of gold is already dissolved in the arsenic solution; and also that the coloring is to be applied to a *metal*, as in the orthodox process (35).

***

The following quotations illustrate the method of obtaining the orange (reddish-yellow) color, characteristic of the Egyptian commercial gold.

BERTHELOT, *op. cit.* III, VI, 10 : " Treat the [black] pyrite [Sb_2S_3] until it becomes yellow, like the color of gold; and verify if the metal when treated appears flawless. If not, do not blame the copper, but yourself. It is because you have not operated carefully."

BERTHELOT, *op. cit.* IV, I, 4 : " Treat pyrite until it becomes yellow " xxx " He calls copper pyrite because of the igneous character of its nature and also because it is necessary that it become so [yellow] in order that the Iosis be accomplished."

BERTHELOT, *op. cit.* III, VI, 11 : " The property of the xerion lies in its ability to make gold [impart its own gold color]. If it does not acquire this and become like gold, possessing the perfect color, untarnished, it can not produce gold."

The final yellowing was so important and so identified with gold that the arsenical reagent was concentrated to make the ferment as powerful as possible (36).

After the two halves of the arsenite solution had been prepared, we have the following theories of what was to take place in the two steps of transmutation.

In the *second step* (leukosis) metallic arsenic, called " mercury," either added or resulting from some reduction of the arsenite solution, gave to the dull red copper the bright appearance of

(35) BERTHELOT, *op. cit.* III, XXI, 3, 4 : " The great HERMES says xxx ' Expose to the sun and rub the sublimate in the sun.' Here and there he cites the ' sun ' [i.e. gold] " xxx " but you should not touch the tincture with the hands for it is poisonous and when *gold is dissolved* in it, it is the most deadly of metallic [solutions]."

(36) As shown in BERTHELOT, *op. cit.* III, XVI, 13.

silver. Further, it was claimed, some of the occult silver in the copper (37) was brought together by the ferment (now deep in the body of the metal) forming a nucleus which gathered to itself all the silver produced so that the copper took on a silvery appearance both inside and outside, i.e. it was silver.

In the *third step* (xanthosis) the second half of the arsenite solution, carrying gold and the orange-colored antimony sulphide, " was warmed until the purple polysulphide colored the whole " and the complex reagent in the xerion was projected upon,—not the copper-lead alloy, but the product of the second step,—the fused " silver "; then the gold ferment gathered to itself the occult gold from the second step plus the gold produced in the third step; and as the ferment and the tincture penetrated with the poison to the depths of the " silver," the total gold was protected by the metal itself and by the igneous character of the arsenic solution.

It is intimated also that during the concentrating of this gold-ferment, mercury (possibly our mercury, carrying gold) was added, and the amalgam was then warmed for a long time (so that some excess of mercury was evaporated) until the mass was changed, on cooling, to a solid.

" A stone, very red, which the philosophers call blood or purple, red coral, red sulphur " (38) and which according to the requirement prescribed on p. 26 [69], does not burn in the fire but melts like wax; thus resembling the purest gold, as it should.

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This final and highest reagent is a medicine so planned that it may impart (1) penetration (2) color and (3) protection.

(BERTHELOT, *op. cit.* Texte Grec, III, XVI, 18) " Thus they prepared mercury as well as ' sulphur ' and the color, by mixing together with gold [literally ' in the sun '] until it became concentrated."

The course of the four steps is checked by this quotation : (BERTHELOT, *op. cit.* III, XXXIX, 4) " Between the blackening

(37) V. p. 23 : " In its secret self, it is silver."
(38) *Compositum de compositis*, of ALBERT THE GREAT.

and the whitening lies the pickling and the washing; between the whitening and the yellowing, the treatment by fusion; likewise between the yellowing and the Iosis is placed the division of the product into two halves... XXXIX, 5 (7) of which one part, changed to Ios, is diluted with the other part and accomplishes the fixation."

6. Iosis

The theoretical conception of the Ios runs so strictly parallel with the entelechy of Aristotle (39), many of whose conceptions are reflected in the theories of Greek alchemy, that we conclude that the Ios stands like the entelechy, for the mature product, the design and hope of all nature, that which has attained the ability to reproduce "another like itself." The extravagant laudation of the Ios, and later of the "powder of projection" and the elixir, would seem to indicate that the idea of unlimited production of gold by use of the philosophers' stone sprang first from the Ios.

We have indications in the technique that the gold produced in the third step was held fused for a long time and then kept warm by being buried in decomposing horse-manure (40), and at the end there appeared in the depths of the metal—just as some gold appeared at the end of the leukosis—a new color, violet to purple, indicative of a higher and still unknown element, called the Ios of gold.

But the language of the Egyptians becomes more confused; and intentionally or unintentionally, less intelligible, as the process approaches this goal.

We have such citations as the following : BERTHELOT, *op. cit.*, IV, I, 4 : "See that the Ios, the true Ios, giving what is called the 'Ios of gold' is produced in the depths of the metal."

BERTHELOT, *op. cit.* IV, I, 11 : "It has been said that the Ios is present in the Sulphur water. We say however that it is so potentially, but that it is developed immediately in the two transmutations; for when the solid yellowing is accomplished,

(39) HOPKINS, *op. cit.*, p. 102.
(40) BERTHELOT, *op. cit.* III, XVI, 18.

it is present not potentially only but actually. Oh, celestial natures, authors of creative nature! It is indeed a creation, that the sulphurs following the metal of magnesia and the essence [ferment] can transform by their creative nature the *material* qualities of the metals into natures spiritual and tinctorial."

The final stage in Egypt, in Islam and in the Latin writings is always punctuated with rhapsody; and here, for the last time we may cite MARY :

BERTHELOT, *op. cit.* III, XXVIII, 9 : " If the two do not become one—that is, if the volatile are not combined with the fixed, nothing expected will take place. If you do not whiten and the two do not become three, with white sulphur, which whitens [all things], nothing will take place which is expected.

But when you yellow, three becomes four, for you yellow with yellowing sulphur.

Finally when one tints into violet, all the materials join together in unity."

— which takes us back to the Ouroboros slogan, " All is one."

NOTE ON THE FATE OF THE IOS

We have many statements that the Egyptian Ios early stood for a spiritual gold—freed from its heavy material base and ready to exert its reactive strength without hindrance; and capable of those amazing feats of reproduction with which we are made so familiar in the days of the pseudo-LULLUS and the pseudo-ALBERTUS.

In Egypt, the four colors characteristic of the four steps, present the sequence : black—white—yellow—violet; but after the discovery of cinnabar, artificially produced, with its brilliant scarlet, the sequence was changed to black—white—red (41). By the time of the Islamic alchemists this sequence is further changed; as with the slipping of the violet-ios into red, the reproductive function of the Ios was transferred to the famous gold-ferment, the xerion, which then became the elixir, and the Ios disappears from the literature.

(41) See HOPKINS, *op. cit.*, pp. 116-117.

CHAPTER II

EGYPTIAN ALCHEMY AS REFLECTED IN THE WORKS OF ISLAMIC WRITERS

Some centuries after ZOSIMUS, alchemy appeared in Persia, in the writings of JABIR and AL-RAZI, JABIR's writings being mostly theoretical (42), and AL-RAZI's experimental (43).

The Islamic writings, compared with those of ZOSIMUS, seem more free from references to ancient ideas and thus more closely woven in technique. Their writers had the advantage over ZOSIMUS, and over us, in that receiving manuscripts just as they were written undamaged by time and commentators, they could select what they found logical and discard what they could not understand. It is to be judged to their credit therefore that in no place, as far as I know, do the writers of Islam so much as mention the spiritual Ios (which one is tempted to think had been very little understood, even by the Egyptians as a whole). But its function, as the powerful ferment, as the reproducer of gold, had won a popular appeal which was too valuable to be discarded. At some time, probably before the date of JABIR and AL-RAZI, we find the material xerion, already famous, promoted to the position vacated by the forgotten Ios.

With this variation understood, it has been possible to find many instances in which roots of the Islamic writings may be traced to the Egyptian. BERTHELOT found (44), in the Book of EL-HABIB, many words, phrases and axioms taken directly from the Greek-Egyptian. One of these especially convincing, is the double import of the word ἀρσενικόν which can be expressed *only in Greek*. But it is more convincing still to find that the

(42) In regard to JABIR's experimental work, I have already shown that it presents nothing original, only methods and materials already given by DIOSCORIDES or the Egyptian writers (HOPKINS, *op. cit.*, pp. 139, 140, 176).

(43) RUSKA praises the experimental work of AL-RAZI, including his exact description of materials, apparatus and methods, although he is still the alchemist, giving innumerable recipes for preparing the elixir. (*Isis* XXIV, 2 (1936), p. 342).

(44) *La Chimie au Moyen Age*, Tome III, pp. 12, 13.

sequence and details in MARY's complicated process of preparation and purification of the scoriae (as described in Sections 3 and 5 of the preceding chapter) are duplicated in the writings of the period of JABIR and AL-RAZI.

I have chosen the short *Book of Pity* of JABIR's school because one can check on its description and details against that which is found loosely scattered in the works of ZOSIMUS.

1. BELIEFS AND THEORIES IN ISLAMIC ALCHEMY

To show that certain theories of Egypt were inherited by JABIR's school, I have drawn up the following list, with Islamic references :

1) JABIR's acceptance of the spiritual character of the reagents in use (especially BERTHELOT, *op. cit.* Tome III, 175, 28-29, given on p. 25 of this thesis).

2) The living metals (BERTHELOT, *op. cit.* Tome III, 189, 73, see p. 28).

3) The metals having body and spirit (BERTHELOT, *op. cit.* Tome III, 176, 31, see p. 24).

4) The necessity for color-transmutation (tincturing) (see *Book of Royalty* (JABIR) BERTHELOT, *op. cit.* Tome III, p. 132, " The true substance is the thing which tints. ") Yet the old easy method of thinking overcame JABIR when he ventured to define the metals as material units : " The metals are all in essence composed of mercury, combined and coagulated with sulphur." (Quoted by HOLMYARD from *The Book of Explanations*, Proceedings of the Royal Society of Medicine, XVI, (1923) p. 11). This sentiment is reiterated by the pseudo-ARISTOTLE and again by AVICENNA (according to VINCENT, BERTHELOT, *op. cit.* Tome I, 276-277, 281, 297)—an important cause of the fall of alchemy in the 17th and 18th centuries.

5) The four orthodox steps, though not directly mentioned, are implied and especially illustrated in the frequent references to the sequence of the second and third steps.

6) The theory of the occult qualities is in high repute (see BERTHELOT, *op. cit.* Tome III, 189, 74, see p. 23; also AL-RAZI, *op. cit.* Tome I, 278) and the pseudo-ROGER BACON in the *Speculum :* " Be sure that in this whiteness, redness is hidden."

7) The extravagant appreciation of MARY's scoriae (see the following section).

8) Gold and silver, as ferments (especially BERTHELOT, *op. cit.* Tome III, 167, 10, see pp. 26-27; and (The Book of EL-HABIB) *op. cit.* Tome III, p. 115 : " Gold comes from gold and with a little one obtains much.")

9) It is easy to see that the purpose of the whole project was gold, even though the Egyptian theory called for a further step, giving them a super-gold. (BERTHELOT, *op. cit.* Tome III, 181, 45, given on p. 27).

2. TWO DIFFERENCES

There have been cited between the Egyptian and Islamic Alchemies two differences.

1st. One fact differentiated Egyptian alchemy from all others —that of its development from a technical foundation.

2nd. It has been stated that the preparation of the elixir was peculiarly Islamic.

This may be shown to be illusory. The discarding of the Egyptian Ios necessitated the substitution of some new vehicle, carrying the same properties, thus holding the advantages and all the attractive publicity of the Ios, but less theoretical and visionary. The continuance of the great transmutation theory was too important to be sacrificed. These properties we find transferred as a whole to the working reagent—the xerion or ferment for gold.

The *Book of Pity* gives a clue to the evolution of the elixir from its predecessor, the xerion, for we find in this the same preparation and purification as is described by ZOSIMUS, with theory applied in each step.

This is made clear also philologically. The word el-i-xir is the Arabic form of the Greek word ξηρός, meaning *dry*, the definite article el being separated by the iota (as required in Arabic) from the principal word *xir*.

Closely connected with the description of the xerion and the like description of the elixir is the fact that each is described as poisonous and thereby able to penetrate into the metals, as a poison impregnates every portion of the animal body. I have indicated this, for the Egyptian school, on pp. 14-15. We have

now to compare this with the Islamic quotations as follows :

BERTHELOT, *op. cit.* Tome III, 181, 48 : " The elixir is called gold or silver because a small portion of the two elixirs is more valuable than a considerable quantity of common gold or silver. It is also called *poison* because of its subtlety and penetration into the metal. Lastly the term igneous is applied to it because it resists the fire."

BERTHELOT, *op. cit.* Tome III, p. 102 (EL-HABIB) : " Mercury from arsenic is the igneous poison which dissolves everything."

BERTHELOT, *op. cit.* Tome III, pp. 66-67 (CRATES) : " To the [alkaline arsenite] it is proper to add some vinegar for this is what produces the colors. At first, there is a sort of yellow mud. Evaporation brings red and finally a saffron colored powder. Cast it upon common silver and you obtain a penetrating spirit. It is the poison, igneous and volatile, which alone easily penetrates the metal and which remains imprisoned in it. It does not increase the weight, for it is a spirit, which has no weight. The poison uniting with the tinctorial spirit, which was produced by the mud, becomes in its turn a spirit in the midst of the complex mass with which it was united. When this substance has penetrated the living silver, the latter lives in its turn which is evident to the eye by the appearance of color."

It would perhaps seem probable that the quality poison, to indicate penetration, is derived from the poisonous quality of arsenic but there is another possibility. The Greek word Ios has two translations (1) violet and (2) poison. This has been the cause of some misunderstanding in the history of alchemy (as explained in HOPKINS, *op. cit.* p. 113).

Perhaps in the word Ios, the Islamic writers received only the second meaning, just as Pliny did.

3. SELECTIONS FROM THE *Book of Pity* (45)

The following selections have been arranged for convenience under separate topics. It is of interest to compare the treatment of each topic, as here given, with the corresponding quotations from the Egyptian, already cited.

(45) BERTHELOT, *op. cit.*, Tome III, pp. 163-190.

The figures in brackets refer to the paragraphs as numbered in the *Book of Pity* (46). I have included a few quotations also from other sources, as indicated.

On the Occult Qualities. (Compare p. 4).

" The red elixir tends by similitude to mix with the red color which silver carries in its interior. It is the elixir which causes the red color to develop and it is due to its force that it becomes apparent. Likewise the [white] elixir tends to mix with the interior white color of copper." [74]

" Copper is potentially silver. It is apparently copper but, in its secret self, it is silver." (AL-RAZI, quoted by VINCENT, BERTHELOT, *op. cit.* Tome I, p. 278.)

Mixing the Spirits and the Bodies. (See p. 8).

" Give the souls to the bodies; destroy the souls in the bodies and purify the souls *and* the bodies. Give the fleeting souls back to the bodies from which they have departed, and to no others. Operate thus until bodies and souls are purified; and continue the operation on the bodies and souls, thus purified, until the whole forms a homogeneous thing, the parts of which are intimately bound together." [13]

" The intimate nature of the soul acting, living, overcomes the intimate nature of the material body, for it transforms it and gives it an immaterial body like its own." [5]

" The spirit penetrates a body only when it is mixed with it and is united with it. Therefore the body must be pulverized and divided into fine particles. Just so, the tincture does not penetrate silver unless its particles are separated by fire. The metal is first made liquid by fusion and then the liquid (mercury) transforms it by a second " fusion," making it fixed and immovable so that fire has no effect upon it. It is not, therefore, as the ignorant think, a simple superficial silvering." [49]

The Power of the Spirit. (See p. 3).

" The body of corporeal things is only the resting place and

(46) These numbers were assigned by BERTHELOT.

refuge for spiritual things. It has no force or utility when the sojourn of the active force has ceased.

The body still remains as the [potential] substratum for the spirit which has left it, since it is from the unstable spirit that its force comes. If one brings back its spirit, the body will certainly combine with it." [31]

" Intelligent men have realized clearly that spiritual forces, such as cannot be apprehended by the senses, are more efficacious, more energetic and more solvent, for the purpose proposed, than any body—no matter what. No body has the least force without the aid of spirits. When the spirits have a living body and are combined with it to the point of resisting the action of fire, it is then that they attain their maximum intensity." (47) [43]

" The philosophers say that operations should be conducted by means of concentrated reagents containing, in great quantity, forces spiritual, subtle and light." [35]

Purification from Excess Sulphur. (See p. 8, note 14.)

" Be careful of the fires which burn the sulphur contained in the interior—in other terms the combustible greases. It is a question of the grease which burns and can be burned. It must be removed from the substances containing it so that they be completely freed from it and purified." (48) [56]

4. Explanations given in the *Book of Pity*

" It is said that the spirits disintegrate the bodies and that the bodies fix the spirits and it is this result which is to be expected from a perfect and rapid tincture." [51]

" Since bodies are hard, solid and resistant, so that they can not be introduced into [other] things (as subtle and light spirits can) one must disintegrate them delicately, by use of spirits which are suitable, so as to give them life, improve and assist them, without destroying or wounding them. But we seek to give the bodies the nature of spirits and such spirits as, while disintegrating,

(47) I. e. in the elixir.

(48) This is the earliest instance, that I know, of the term *grease* meaning sulphur (the very combustible substance with oily touch),—in common use in the days of Paracelsus and Stahl.

impart to them life, subtlety, lightness and penetration. Some employ surface methods, others penetrating methods." (49) " When the body has been modified and become subtle and light, it then becomes a sort of spiritual thing penetrating [other] bodies while holding its peculiar nature which allows it to resist the fire. (Compare Chapter I, section 5, pp. 11-12). At this moment, it mixes with the spirit and in its turn fixes it. Each of these is transformed in taking the nature of the other. Of these two elements there results a light substance which has neither the solidity of the body nor the subtlety of the spirit, but takes a place exactly intermediate between the two extreme limits." [52] (Chapter I, section 3, p. 7.)

" No one among those who proclaim a principle in which they believe, has a faith so firm, as that of those philosophers who say that one must fix the spiritual element with the body adapted to it, so that it can not be separated from it by fire. Such is the mixture —a complete combination, which can not be destroyed in any way." [53]

" The body and the spirit, being thus intimately united, as no longer able to be isolated one from the other, find themselves like the waters of the Tigris mingled with those of the Euphrates." [57]

" See how many things there are in this world, spiritual and subtle, which the senses can not realize and which we can know only by intelligence. For example, the magnetic stone attracts iron by virtue of a spiritual force which we can not realize or see. Its force is even exerted across a mass of sulphur interposed between the iron and the magnet. Poisons act by virtue of their internal forces. Musk and amber act in the same way." [28-29]

" The end to attain is to re-unite the spirit to the body and then fuse them together." [68]

" We seek to obtain such a result that the elixir after its complete preparation becomes a subtle poison, spiritual and corporeal; likewise that its body and its soul be of the same nature, not divergent, and that the elixir be like a poison in its subtlety, lightness and penetration. We seek still that it be transformed, when it is in contact with fire, just as is the poison which

(49) See p. 2, note 2 (OSTANES).

penetrates the flesh. We have attempted to make the poison become of the nature of fire, that it be nourished by fire and enclosed in this element, so that it acquire fixity, duration, brilliancy, beauty and color because its actions ought to become of the same nature as fire; for, if not, the fire would immediately destroy it." [27] (See p. 12.)

Treatment of Purification of The Scoriae, as given in the "Book of Pity."

"Free all the products of your work from impurities, blackness, discolorations, greases and humidities which cause repulsion and corruption. Disintegrate the scoriae which remain at the bottom of the apparatus, those which are bodies, so that they may have the nature of spirits which volatilize before the fire. Fix the spirits which during the true operations escaped from the bodies. Fix them with the bodies which remained at the bottom of the apparatus so that the spirits acquire the nature of bodies which resist the fire and that there be not the least difference between the spirits and the bodies.

Remember that dyes in general do not penetrate fabrics, in any extent, when these materials are dry. They need moisture to make [the dyes] cling to the cloth and penetrate, depending on their strength. It is the same with our tincture. It does not penetrate the matter to tint it, unless it has been mixed with moisture [Hg] derived from a gold-making mixture. Then the fire evaporates the moisture [Hg] and the tincture remains [fixed]." [64, 65, 66, 67]

"If one does not employ any mercury in the operation, it will never succeed in a complete manner, ... It is necessary that the process be complete up to the point where the product resists the fire and does not burn but melts like wax (50). [69]

The Ferment of Gold.

"It has been said 'Man begets only man. The bird begets

(50) As gold does without tarnishing and as an amalgam does. This description of the elixir is found also in BERTHELOT, *op. cit.*, Tome I, 338; also Tome III, 145; and is common in Latin alchemy. (Compare Chapter I, section 5, especially p. 16).

only a bird.' It is the same for wild animals, reptiles and all other animals. They beget only beings of like form as themselves. Thus gold can produce only gold; and silver, silver." [10]

" Gold can come only from gold, silver from silver and a child from a father." xxx " The red elixir is of the same nature [red] as gold and it is considered like gold. The white elixir is of the same nature as silver. That is why they say ' Our gold is not common gold nor our silver, common silver.' Their gold and their silver are tinted with the elixir and superior to common gold and common silver." (51) [45]

Gold the Supreme Metal.

" At last, the process passes through all the degrees of metals, until it arrives at that of gold, which is the climax." [47]

Fixing the Sulphur and Arsenic.

" It has been said that sulphur and arsenic may be fixed by means of marcasite, tutty, talc and other like (earthly) substances (52). They are the most favorable bodies to render the combination proof against the action of fire, which then cannot attack it. Such is the earthy fixation." [55]

Eulogy of the Elixir.

" Such is the elixir, which overcomes the natural and elementary natures in the metals, which transforms them so that they can never return to their primitive state. This is the course taken by prophets, saints and all philosophers." [54]

" Know, dear brother, that the [arsenical] water (if mixed

(51) To interrupt this sequence, note what AL-GILDAKI (13 C.) says : " If men say that gold is the most precious stone they do not mean common gold extracted from gold ores, because common gold does not produce a tincture by which other (metals) may be colored, since it contains only just sufficient color for its own body. It contains no surplus tincture. But our gold which has the desired quality can make gold and tint into gold."

And note what ZOSIMUS says : (BERTHELOT : *Collection des anciens Alchimistes Grecs*, III, VI, 10) " But our gold which possesses the desired quality can make gold and tint into gold."

(52) These substances are mentioned in the works of later writers without explanation.

with the tincture and the oil [solution containing the catalyst] to make a homogeneous whole and if the liquid [resulting] then ferments) [such water then] solidifies and becomes like a grain of coral; and it gives a product easily fused and in a way like to that of wax; and which penetrates into every metal. This substance, obtained thus, as I have first said, constitutes the *Imam* [Chief or High Priest]. This is what I mean by those words : ' at least, may God favor me by permitting me to see the Imam.' " (*Book of Royalty*, BERTHELOT, *La Chimie au Moyen Age*, Tome III, pp. 127, 129 and 137.)

" If one of weak intelligence, of low understanding and little experience, maintains that these spirits, these bodies and these tinctures produce no action, that they do not recognize each other or refuse to recognize, that they neither agree nor disagree, that they do not combine with each other or repel one another, he has only to try this on the fire and he will see all that has just been said." (53) [73]

CONCLUSION

IN CHAPTER I.

We find evidence that the Kerotakis process was more complicated than has been suspected. The scoriae were subjected to a particularly careful process of purification—remarkable for its day. From this purified powder, the process proceeds to the preparation of the final *xerion*, i.e., the complex reagent for transmutation into gold.

A " triad " of contributing preparations must be ready, to be added to the original powder, in order to supply three qualities necessary for success in the final process. Those requisites are permeability and tincturing power towards the metal to be transmuted; and protection of the ultimate product called gold.

With this new interpretation, the method, as loosely described by ZOSIMUS, seems intelligible for the first time.

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(53) See also the long section [72] onpp. 188-189 : " Elixir, like a loyal army."

IN CHAPTER II.

We find, in the works of JABIR and others, evidence of a knowledge, unconcealed, of this Egyptian process, as now interpreted, and of theories purely Egyptian.

The *Book of Pity* contains an extended process for the purification of the elixir. ZOSIMUS had given a process for the purification of the scoriae or xerion. The two accounts are identical. (Compare Chapter I, section 3 with pp. 24 and 26). On p. 26, will be found the preparation of the elixir [27] followed by the purification of the scoriae [64 and 65], both from the *Book of Pity*.

This *Book of Pity* would be quite unintelligible without the previous presentation by ZOSIMUS, especially the portion developed in Chapter I, section 5, pp. 11-17, on the two tinctures.

If I have previously insisted upon the meaning of Ios and Iosis, as used in ZOSIMUS, and the historical replacement of the Ios by the Arabic Elixir, it was because this interpretation seemed clearly indicated by many passages in ZOSIMUS; and without it, no one had been able to explain the unlimited power assigned to the Ios by MARY. The discussion in Chapter I, section 6, pp. 17-18 and in Chapter II, pp. 21-22 confirms the early thesis. Now it is evident that, with the Islamic writers, the elixir was not only identified with the „ perfect xerion " but also included in its powers all the properties formerly ascribed to the Ios.

The two accounts, of ZOSIMUS and of JABIR, agree so closely that we are forced to decide—if additional evidence is necessary—that, with the survival of the most important of the Egyptian methods to so late a period as the 9th or 10th century, we have here an inheritance which links the literature of Islam with that of the Egyptian ZOSIMUS; and this so closely that any discussion in The History of Alchemy of the theories of Islam, or of the methods or the objectives, must take into account that, five centuries before, these same ideas flourished in Egypt more successfully probably than ever after.

Amherst, Mass. ARTHUR JOHN HOPKINS.

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NOTICE TO READERS AND BINDERS

Please insert this slip in A. J. HOPKINS' article (*Isis* 29, 326-54, 1938). All the errors have the same origin: a change of pagination unnoticed by the proofreaders.

P 329	Note (6)	17 — 342
332	Note (13)	14 — 339
337	line 3	22 — 347
341	line 24	26 — 351
"	Note 37	23 — 348
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345	Section 6)	23 — 348
346	line 4	26-27 — 351-352
"	" 10	27 — 352
"	last line	14-15 — 336
348	line 4	4 — 329
"	" 13	8 — 332-333
"	" 32	3 — 328
349	line 17	8 — 333
350	line 6	11-12 — 336-337
"	" 12	7 — 332-333
351	line 6	12 — 337
"	Note 50	16 — 341
354	line 7	24 — 349 (56)
"	"	26 — 350-351 (27) 351 (64, 65)
"	"	26 — 350-351
"	line 13	11-17 — 336-342
"	line 20	17-18 — 342-343
"	"	21-22 — 346-347

Professor John Winthrop's notes on sun spot observations (1739)

JOHN WINTHROP, the second Hollis Professor of Mathematics and Natural Philosophy at Harvard, was born in Boston on December 19, 1714. His forebears had been eminent men in Colonial New England and he was the third JOHN WINTHROP to be elected a Fellow of the Royal Society. His great-granduncle, Governor JOHN WINTHROP, F. R. S. (1606-1676) (1), was a charter member of the Royal Society and it was he who gave Harvard its first telescope in 1672. Entering Harvard in 1728, WINTHROP received his A. B. in 1732 and his A. M. in 1735. In July 1738, ISAAC GREENWOOD, who had been WINTHROP's master, was forced to resign from the Hollis Professorship as a result of his "Various Acts of gross Intemperance." The next month WINTHROP, at the age of twenty-three, was selected for the chair of the Hollis Professor, and in due time was formally appointed to the position which he held until his death in 1779. The first known record of WINTHROP's scientific observations is his notes on sun spots made in 1739. The next year he observed the transit of Mercury and a lunar eclipse, and his work on these two phenomena resulted in his first communication to the Royal Society (2). Two years later he began a record of his meteorological observations at Cambridge which he maintained until 1763. The Lisbon earthquake of 1755 aroused his interest in seismology; an interest which resulted in a lecture on earthquakes presented in Holden Chapel at Harvard (3) and later in a paper

(1) BROWNE, C. A. *Scientific notes from the books and letters of John Winthrop, jr.*, (1606-1676). In *Isis*, Vol. 11 : 325-42, 1928. WINTHROP genealogical chart on p. 342.

(2) WINTHROP, JOHN. *A letter... concerning the Transit of Mercury over the Sun, April 21, 1740 and of an Eclipse of the the Moon, Dec. 21, 1740.* In the *Philosophical Transactions of the Royal Society*. Vol. 42 : 572-78; 1742-43.

(3) WINTHROP, JOHN. *A Lecture on Earthquakes...* Boston; New-England: Printed and sold by EDES & GILL, 1755.

published in the *Transactions* of the Royal Society (4). In April 1759 WINTHROP observed HALLEY's comet and soon he delivered two lectures on comets in the Harvard Chapel (5). Continuing this work on comets, he was able to discuss their phenomena with authority in his *Cogitata de Cometis* (6). WINTHROP also appreciated the importance of the transits of Venus as is evidenced by his leading the first American scientific expedition when he sailed from Boston to St. John's, Newfoundland in order to observe the transit of 1761. He was forced to observe the 1769 transit in Cambridge, as his health would not permit him to make a proposed trip to Lake Superior (7). In 1766 he was made F.R.S. and in 1768 he was elected to the American Philosophical Society. The University of Edinburgh in 1771 and Harvard in 1773 conferred upon him the honorary degree of Doctor of Laws.

As for his ability as a lecturer and instructor, Professor MORISON states that " Equally skilled as a teacher, WINTHROP had the privilege of introducing four decades of undergraduates to the scientific point of view, and of imparting the first impulse to at least one greater American scientist than himself—BENJAMIN THOMPSON (Count RUMFORD), who described him as ' an excellent and happy teacher.' " (8) In his sixty-fifth year, WINTHROP died at Cambridge on May 3, 1779 (9).

Although WINTHROP is variously referred to as America's first scientist, first astronomer, and first seismologist, he was not the first man to do creditable scientific work in the Colonies. One of the many instances of previous scientific activity was the use by THOMAS BRATTLE, tutor at Harvard, of the three-and-a-half-foot

(4) WINTHROP, JOHN. *An Account of the Earthquakes felt in New-England...* Royal Society. *Philosophical Transactions*, Vol. 50 : 1-18; 1757, pt. 1.

(5) WINTHROP, JOHN. *Two Lectures on Comets...* Boston, Printed and sold by GREEN & RUSSEL, 1759.

(6) WINTHROP, JOHN. *Cogitata de Cometis.* Royal Society. *Philosophical Transactions*, Vol. 57 : 132-54, 1768.

(7) WINTHROP, JOHN. *Two Lectures on the Parallax and Distance of the Sun.* Boston, EDES & GILL, 1769, Footnote pp. 43-44.

(8) MORISON, S. E. *Three Centuries of Harvard* 1636-1936. Cambridge, Mass., Harvard University Press, 1936, p. 93.

(9) For a more complete account of WINTHROP's life and work see F. E. BRASCH's article in the *Dictionary of American Biography.* (New York, C. SCRIBNER's Sons, 1928-36), Vol. 20 : pp. 414-16.

1739. April 19th at Boston walking on ye common a little
set, ye air being so hazy, yt I was able to look
saw with my naked
it was shape was long,
and to ye horizon.
back to Cambridge I observed ye with an 8 foot telescope
discovered not only ye same spot, such I saw before
but several others.
in ye telescope, with inverted ym.
cluster of spots marked A was
I saw at Boston, which
appeard ym like one large
spot. ye spot at B appeard like
much like ye thick
of smoke wch come out of
a furnace. At night a
considerable aurora borealis.
20. cloudy.
21. cloudy.
22. yy appeard thus.
I am since informd of several
persons in ye country saw ym like
wth ye naked eye, particularly
some at medford. ye foreymen
at Charlestown ferry.
April 20.
A
B
22
As C.T. ☉ long
:R
:: ☌ 23.29
T. 1ʳ. a second
As R
:☉ long
:: ☌ 23.29.
:☉ declin
15' after π at 6° 27'

FIG. 1

Facsimile of WINTHROP's MS notes on sun spots

(Courtesy of the Harvard College Library).

telescope mentioned above to observe the comet of 1680. The value of his results may be inferred from the fact that NEWTON used them, with favorable comment, in the *Principia* (10). To describe WINTHROP as the " ... first important scientist or productive scholar on the teaching staff of Harvard College " (11) is much more accurate than to ascribe several American " firsts " to him. BENJAMIN FRANKLIN (1706-1790), a contemporary and friend of WINTHROP, was the more original thinker of the two. WINTHROP never displayed the real genius that characterized FRANKLIN's work. Nevertheless, his formal training in mathematics and physics enabled him to explore fields that were closed to FRANKLIN. Because of his long training, WINTHROP is undoubtedly the most important American pioneer in mathematics and astronomy.

Interest in the heretofore unpublished manuscript notes of WINTHROP's sun spot observations arises from its value as a document contributing to the history of science in America and to the history of the life of an American scientist. It also adds definite facts to the records of sun spot data and observations of aurora. The following is a free transcription of the manuscript which has been reproduced in Figure 1 :

1739 April 19th at Boston. Walking on the Common a little before sunset, the air being so hazy that I was able to look on the sun, I plainly saw *with my naked eye* a very large and remarkable spot. Its shape was oblong and the length of it was perpendicular to the horizon. I observed it several minutes till the sun was actually set. It was likewise seen by several persons in the company of Messrs. Skinner and Read. The next day, Friday, coming back to Cambridge, I looked at the sun with an 8 foot telescope from 6 A.M. till sunset and discovered not only the same spot which I saw before but several others in his disk. They appeared something in this manner in the telescope which inverted them. [Drawing of April 20, see facsimile]. That cluster of spots marked A was what I saw at Boston and which appeared then like one large spot. That at B appeared very much like the thick column of

(10) MORISON, S. E. *Astronomy at Colonial Harvard.* In *The New England Quarterly*, Vol. 7 : 3-24, 1934, pp. 19-21. Also the same author's *The Puritan Pronaos.* New York, New York University Press; London, Oxford University Press, 1936, pp. 245-46.

(11) MORISON. *Three Centuries*, p. 92.

smoke which comes out of a furnace. At night a considerable aurora borealis.

Saturday April 21. Cloudy.

Sunday April 22. They appeared thus. [Drawing of April 22, see facsimile]. 15′ after n at 60°27′.

I am since informed that several persons in the country saw them likewise with their naked eye, particularly some at Medford and the ferrymen at the Charlestown ferry.

These notes occupy one quarter of a sheet which has been stiched to five other sheets bearing notes on the determination of the Cambridge latitude. Although there are no marks of identification on any of these sheets, the handwriting is unmistakably WINTHROP's. As stated above, this is the first known record of WINTHROP's scientific work, but it is possible that notes of earlier observations may still be extant.

At the time of these observations the sun spot activity was close to a maximum or slightly past the maximum. RUDOLF WOLF has found that the years 1734.0 ± 1.0 and 1745 ± 1.0 were minima and that the intervening maximum occurred in 1738.7 ± 1.0(12). WINTHROP's observations were made at a time within the limit of error of WOLF's calculation of the maximum. As can be seen by the large variance in the relative positions of the spots in the two diagrams, WINTHROP's drawings are too inaccurate to be used in an attempt to check WOLF's findings by determining the latitude of the spots. The areas of the spots are also merely diagrammatic and prevent any calculations on this basis. It is possible however to make an approximate determination of WOLF's relative sun spot number by the use of his formula $r = k\,(10g + f)$, where r is the relative number, g the number of groups and single spots observed, and f the total number of spots obtained by adding the number of spots in the groups to the single spots. The constant k depends upon various personal factors of the observer and the power of the telescope used. WOLF, a good observer, set k equal to unity for himself when he used his three-inch refractor having a power

(12) WOLF, RUDOLF. *Astronomische Mittheilungen XXIII.* In the *Vierteljahrsschrift der Naturforschenden Gesellschaft in Zürich*, Vol. 12 : 109-154, 1867, p. 135.

of 64. Neither WINTHROP nor his predecessors have recorded the power of the 8-foot telescope which was probably lost in 1764 when the rest of the "Philosophical Apparatus" was destroyed in the burning of old Harvard Hall. This instrument is undoubtedly the one which Harvard acquired in 1712 (13). In describing the instruments which he used in 1722, THOMAS ROBIE includes an 8-foot telescope (14) and in 1743 WINTHROP stated that his instruments were the same as those "... mentioned by the late Mr. THOMAS ROBIE in Philosophical Transactions No. 382..." (15). This particular instrument would have had to have an eyepiece with a focal length of slightly less than 1.5 inches in order to have a power of 64. It is improbable that such a telescope, constructed before 1712, would have had an eyepiece meeting this requirement. Therefore, while the power of this telescope cannot be determined definitely, it is safe to say that it was considerably less than 64. In calculating the WOLF number from WINTHROP's two drawings, to use k as unity will result in too low a sun spot number. Using $k = 1$, the relative numbers obtained are 85 and 87. As given by WOLF, the relative sun spot numbers for the years 1738 and 1739 are 85.0? and 78.5 respectively (16). Certainly WINTHROP's results compare favorably with WOLF's findings.

The most interesting record in WINTHROP's notes is that of "... a considerable aurora borealis" on the night of April 20th. An aurora was observed this same night (May 1, new style) by HUXHAM in Plymouth, England, KRAFT in St. Petersburg (17), BECKMANN in Mark Brandenburg (18), and MUSSCHENBROEK in Utrecht (19). The important point in WINTHROP's observation of this aurora is that he has recorded it in connection with his sun spot notes. It is difficult to say whether this is incidental

(13) MORISON, S. E. *Three Centuries*, p. 58.

(14) ROBIE, THOMAS. *Part of a Letter... concerning... the Eclipse of the Sun in November* 1722... Royal Society. *Philosophical Transactions*, Vol. 33 : 67-78, 1724, p. 69.

(15) WINTHROP, *op. cit.*, p. 572.

(16) WOLF, *op. cit.*, p. 135.

(17) LOVERING, JOSEPH. *On the Periodicity of the Aurora Borealis*, 1868. (From the *Memoirs* of the American Academy, New Series, Vol. X), p. 44.

(18) *Ibid.*, p. 249.

(19) *Ibid.*, p. 307.

or accidental. Although a definite relationship between sun spot activity and auroras was not securely established until after the middle of the nineteenth century, principally by the work of FRITZ, LOVERING and LOOMIS, the possibility of such a relationship had been suggested by MAIRAN as early as 1733 (20). MAIRAN's work was reviewed in the *Philosophical Transactions* in the same year (21), but no specific mention was made of the sun spot and aurora suggestion. The reviewer did note however, MAIRAN's statements concerning a possible connection between sun spots and the zodiacal light (22). Inasmuch as the aurora note is the only item in WINTHROP's manuscript that does not bear directly on his sun spot observations, it seems probable that he had some conception of an association of these two phenomena. He may have known of MAIRAN's work or have received a hint from the *Philosophical Transactions*. The Royal Society's publications had long been available in Boston and in 1743 WINTHROP requested that the Treasurer of Harvard College "... endeavor to procure the several Philosophical Transactions of the Royal Society after No 453 to this time." (23) No. 453 was for April, May and June 1739. It seems probable that by 1739 the *Philosophical Transactions* for 1733 might have been read by WINTHROP.

Although there is nothing startling in WINTHROP's notes, they do reveal that the young scientist—he was twenty-four at the time—was keenly interested in natural phenomena and an intelligent observer. Since there is but little known of his life between 1735 and 1740, this document closes part of the hiatus. It has only a small value as an isolated record, but it furnishes significant evidence of WINTHROP's early scientific activity.

Cambridge, Massachusetts. FREDERICK G. KILGOUR.

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(20) MAIRAN, J. J. D. de. *Traité Physique et Historique de l'Aurore Boréale.* Paris, De l'Imprimerie Royale, 1733, p. 250.

(21) EAMES, JOHN. *An Account... of a Book entitled Traité Physique...* Royal Society, *Philosophical Transactions*, Vol. 138 : 243-57, 1733.

(22) *Ibid.*, p. 256.

(23) *Harvard College Records.* (Boston, Colonial Society of Massachusetts, 1925-35) (Publications of the Colonial Society of Massachusetts, vol. XV-XVI, XXXI, Collections), 3 vol. Vol. 2, p. 732.

Some bibliographical notes on the first publication on the Roentgen Rays

On December 28th, 1895 the secretary of the Institute for Physics of the University of Würzburg received a paper by W. C. ROENTGEN on his great discovery, with the title :

Eine neue Art von Strahlen. (Vorläufige Mittheilung).

The original copy still exists at that institute, and it bears an editorial notice : "An den Schluss vor dem Jahresbericht" (to be printed at the end before the account of the year's proceedings). We find it printed there, pp. 132-141, at the end of the volume for 1895 of the "Sitzungsberichte der Physikalisch-medizinischen Gesellschaft in Würzburg." The printers and publishers of that periodical, the "Stahel'sche K. Hof- und Universitaets Buch- und Kunsthandlung" had a number of separata printed at once and issued in a yellow wrapper, with the date "Ende 1895" and as it was quickly done, without a separate title-page : just the text of the paper on ten pages. This first separate edition of ROENTGEN's paper apparently went out of print immediately, for during 1896 the Stahel'sche Buchhandlung issued the second up to the fifth editions of it. The second edition had the same yellow wrapper covers, but clearly indicated : 2. Auflage, and the date "1896"; it had also, as well as all the following editions, a separate title-page, repeating the title of the cover, which brought the size of the treatise to 12 pages. The wrappers of the second edition have different advertisements from the first edition, and these advertisements then remain the same for all following editions. It seems that the text was newly set up for the fourth edition. Early in 1896 ROENTGEN published a continuation of his paper in the "Sitzungsberichte" vol. 1896, pp. 11-19, with a plate of an X-ray of Professor KÖLLIKER's hand. The Stahel'sche Buchhandlung had a separatum printed of it at once, with the title : Eine neue Art von Strahlen. II. Mittheilung, Würzburg, 1896. Without any doubt, the publisher was aware of a large demand for these separata when he printed the "II. Mittheilung", and he printed a larger edition of it than of any of the first paper; there exists only one edition of the "II. Mittheilung", and even today it seems to turn up more often than any

EINE NEUE ART

VON

STRAHLEN.

Von

DR. W. RÖNTGEN,

O. O. PROFESSOR AN DER K. UNIVERSITÄT WÜRZBURG.

WÜRZBURG.

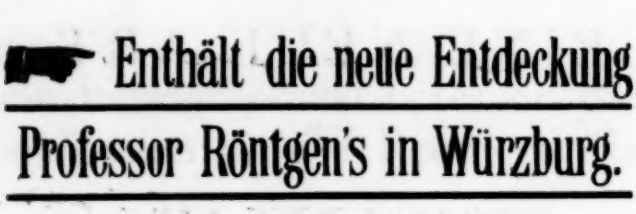
VERLAG UND DRUCK DER STAHEL'SCHEN K. HOF- UND UNIVERSITÄTS-BUCH- UND KUNSTHANDLUNG.

Ende 1895

60 S.

Wrapper of the First Edition printed on yellow paper

of the five editions of the first paper. The wrappers of the second paper are of an orange colour. There exist copies of the third, fourth



Publishers strip on red paper to the third edition

and fifth edition of the first paper and of the "II. Mittheilung" with a publisher's red strip announcement :

☛ Enthält die neue Entdeckung Professor Röntgen's in Würzburg.

Bibliography

First Paper ("Vorläufige Mittheilung")

1. Eine neue Art von Strahlen. Würzburg. Verlag und Druck der Stahel'schen K. Hof- und Universitäts-Buch- und Kunsthandlung. *Ende* 1895. 8vo. pp. 1-10 + 1 blank leaf (showing signs of offprint from p. 10.) Begins :
   Aus den Sitzungsberichten der Würzburger Physik-Medic. Gesellschaft 1895.
   At the end of p. 10 : Publisher's address under a line.
   Yellow wrappers, p. 3 of cover blank, pp. 2 and 4 advertisements. (This edition is the only one which has no separate title-page and therefore only 10 pages).
2. Same title, with the addition : 2. Auflage and "1896" as printing year. 8vo. (p. 1) Title (same as on the wrapper, only without the price : 60 Pf.); (p. 2) blank; pp. 3-12 text, beginning : Aus den "Sitzungsberichten der Würzburger Physik.-medic. Gesellschaft" 1895. (Beitrag) (The inverted commas and (Beitrag) are additions in this and the following editions). Yellow wrappers with different advertisements on pp. 2, 3 and 4 of cover.
3. Same title, with note : 3. Auflage; otherwise exactly as 2., also the same advertisements. Colour of wrappers is a light brown.
4. Same title, with note : 4. Auflage. Text on pp. 12 ends with a short

line; otherwise exactly as 2. and 3. Colour of wrappers same as 3.).

5. Same title, with note : 5. Auflage. Below the printing year, 1896, two lines are added :

☞ Die vorliegende Broschüre erscheint auch in *englischer*, *französicher*, *italienischer* und *russischer* Sprache.

Otherwise exactly as 4., also colour of wrappers.

Second Paper. ("Fortsetzung".)

1. Eine neue Art von Strahlen. II. Mittheilung. Würzburg. Verlag und Druck der Stahel'schen K. Hof- und Universitäts- Buch- und Kunsthandlung. 1896. 8vo. (p. 1) Title (same as on the wrapper, only without the price : 60 Pf.; (p. 2.) blank; pp. 3-9 text; pp. 10-12 advertisements. The text on page 3 begins halfway down with the heading : Über eine neue Art von Strahlen. (Fortsetzung.) at the same height as in the "Sitzungsberichte" vol. 1896, p. 11. The separate edition has no illustration of Professor KÖLLIKER's hand. The wrappers are of an orange colour; p. 2 of cover is blank; the others have advertisements.

These notes are meant as a bibliographical supplement to G. SARTON's paper on The discovery of X-rays, with facsimile reproduction of RÖNTGEN's first account (*Isis* 26, 349-69, 1937).

(London) E. WEIL.

The Idealism of Giovanni Gentile (*)

Whatever we do know about the ways of knowing, and whatever clarification the scientific philosophers may have reached in their endeavors, one thing seems fairly certain, i. e. that common sense goes on being at a discount. Theoretical physics in the past thirty years has done much to discourage the simple-minded type of scientist who approached theory in the state of mind of the gadgeteer. A recent attempt at rigorous thinking — we refer to Professor DINGLE's latest book—ends in a kind of reluctant idealism; all the more significant in that it proceeds from a physicist who has never been reconciled at heart even to relativity. All in all, and notwithstanding the brilliant punitive forays of a certain school of scientists into the field of philosophy proper, there is a general atmosphere of uncertain expectancy and dark miscomprehension.

It may therefore be highly interesting to compare the status of the scientific philosophers with that of a school of thought most thoroughly alien to science—Italian "actualist idealism" in the person of its eloquent and prolific expounder, Professor GIOVANNI GENTILE, of whom WILDON CARR could write recently : " it is doubtful whether there is a more influential teacher in the world today." The very able exposé that Mr. HOLMES has achieved should be praised on many a ground. Not only has he succeeded in conveying a doctrine " almost impossible to express in black and white ", and one which of all current philosophies is the most

(*) Apropos of the book bearing the same title by ROGER W. HOLMES (264 p., New York, MACMILLAN, 1937). It may be interesting for American readers to compare it with another competent treatment of the subject : P. ROMANELLI, " The philosophy of G. G. ,, (New York, VANNI, 1938). Dr. HOLMES' is the more comprehensive of the two. Also, it gives a fundamental criticism and appraisal in terms of both idealistic and non-idealistic thought. The important critical chapters of his work are : The egocentric predicament, Form and matter, The Gentilian metaphysics and the meaningful, The contribution of GENTILE.

alien to the tenets of common sense : but he has managed at the same time to express shrewd and penetrating criticism. He has coaxed and forced GENTILE into the open, into the company of living men and ideas, and drawn him out of the somewhat turgid and stuffy isolation which is so characteristic of oratorical wisdom.

This kind of thought is important, less because of the solutions it affords, than because of its comprehensiveness and well-rounded formal perfection. Its enemies will say that it hunts the philosophic hare into the ground. Its friends, that it provides a landscape and a setting for any other thought; once understood (not an easy process, we grant) it allows one to locate many of the more lasting issues.

Let us start from the common sense view of the philosopher's business. Here is Man, with his five senses and his will, eager to comprehend somehow this world around him and in him, disquieted in turn by the starry sky and by the moral law. Science thought it could crystallize this attitude by explaining the starry sky and taking the moral law as an emotional datum. It would have been all very well, if the outer world had stayed explainable, but this expanse of good solid matter has been turning, meanwhile, into operational concepts of doubtful materiality. Nothing daunted, the " physicalists " of the Vienna School have sought to consolidate at this level, by accepting the pragmatic view of knowledge and working it out as a refined instrument to push metaphysics out of the game. A proposition which makes sense, they say, is either logical or empirical. If it is purely formal and logical, like mathematics, it resolves into a tautology; if empirical, it is referable to the given outside, and there to be tested for truth or falsity. There is nothing here with which GENTILE would not concur. If we should ask, however, what false or true mean, the physicalist would fall back on operational criteria : True is " what works ", and that is all there is to it. Any step beyond that will be condemned as meaningless. Knowledge means expert working acquaintance with a certain level or department of reality.

Unfortunately, it is not so easy to rule out the old desire to know, and reduce it to engineering or to accountancy. Philosophy rears again its uncouth head, and will not let itself be shooed off like that. Only it is clear that there are certain pastures to which

it cannot go back. The old idea of the mind " mirroring " reality has been gone for centuries. And if we cast about for something else that the mind can do about reality, we find ourselves in a nasty dilemma. Either reality is just " the given ", something alien to be taken on trust from pointer readings, and then the very question of knowledge loses point somewhat. Such an alien world can be described, even as the physicalists are telling us, in some coherent language, it cannot be in any way comprehended, and " knowing " is just a sound for a vague and contradictory yearning, no more meaningful than the inchoate dreams of adolescence. Or—we resolutely admit that a Truth exists, that our act of affirming it has a meaning — and then we cannot look for it in the Given. The very fact of its being given makes it previous and alien to our thinking. We can accept it, we cannot endorse it. It is neither universal nor necessary according to our mind. Can we call that a truth? A truth transcending the subject is neither a truth nor a knowable reality. GORGIAS discovered this quite a few years ago. It is taken on faith and has nothing to do with knowledge. And even if it is such as to be directly immanent in us, and directly intuited, it cannot be affirmed except as a blind wager. It does not partake of what we should mean as truth. Whatever hunch we may have about an inner truth, it is only an act of knowing that brings it out and makes it such. And this act of knowing obviously has little to do with the external world.

All this time we may be said to be still following the physicalist's directions. We are trying to give a meaningful content to the word " knowing " and find that it cannot be figured as a bridge between two realities, outer and inner, but rather as a pure act, springing out of the spirit and returning to it — an act, indeed, which is the whole of the spirit.

The analogy to FICHTE's thought will be seen easily. Time has passed, and issues have become clearer. GENTILE does not even presuppose a rational world, as Hegelians do. His world contains nothing that does not derive from the pure act of thinking. In this way, an extreme rationalism of the idealistic kind is bound to be the outcome. When we set about to construct a logic, it will have to be a priori. But how, people ask, does this logic create itself? Let Dr. HOLMES answer : " It is customary for the

logician, aware that his subject matter exhibits circularity, to be disturbed by the fact that the development itself of a formal structure for the expression of thought requires a formal structure already presupposed. But for GENTILE, the fundamental aspects of logic are not concerned with contradictions." (We shall see shortly how, speaking of the logic of the concrete) " Logic *is* the act of thinking. If there is nothing external to thinking, the thinking itself which is in search of a logic (and a real) provides in that search its logical principles."

Again, one might ask how GENTILE is going to lift himself up by his own braces. To be sure, he has to rely on the doctrine of internal relations : but it is no presupposition, it is rather a renewed statement of the absence of presuppositions. Knowledge comes from within thinking itself : such a position is bound to take unto itself the doctrine of internal relations, for if all entities are contained within the act of thinking they will consist of their relation to one another within thought.

Idealism is that peculiar creed which takes relations seriously, rather than beings. It founds them on the unity of the spirit, and this unity cannot be founded on anything else. It may be sad, but none of us can avoid the toils of some idealism, except maybe the theologian. A scientific philosopher like MEYERSON will interpret the whole of scientific knowledge, and the very mathematisation of the real, as a devious but obstinate assertion of that identity. If we take the full consequences, we realize we must pit our thought against the whole of reality, assert our will to comprehend it utterly; in the same sense, we mean, as the watchmaker comprehends the watch; not as the chemist or the draughtsman would, as an analysis of parts or as a static show. We must know that we want to understand and not to describe.

Now the scientist cannot do it, and says so. It was once the proper job of the metaphysician. He would solve the world in terms of a " higher " and simpler " reality ". But this reality, in turn, was a guess of his, and its simplicity arbitrary. He could comprehend the world only by having recourse to God as a mediator and a guarantor of that reality. If we want to do away with mythology, we must make the Self perform all the services once discharged by the All-Comprehending — in short, attribute to it all the properties of Godhead; granting our human condition

only an infinite allowance of time to get where God might have been from the beginning. These are the rules of the game. Else there is no philosophy.

Why should there be anyhow, says a physicalist like WITTGENSTEIN, and many of us will whole-heartedly approve: " The right method of philosophy would be this. To say nothing except what can be said, i. e. something that has nothing to do with philosophy, i. e. the propositions of natural science..."

But if there is no philosophy, then we are left with poetry as the only source of values. Again, the physicalist may consent, and many along with him. But men are not all physicists and poets, there will be some who want a lantern to go by : who want to know whether the word " true " cannot be applied at all in that zone whence spring aesthetic and moral values. Understanding may become a necessity of life. WITTGENSTEIN, personally, supplies it to himself through an experience which is "not to be talked of". Philosophy claims that it must be able to talk, to know good from bad and show how.

No method of classical logic can do it. The metaphysicians had struck there a wildcat hole. But it could not be otherwise, since logic deals only with abstractions, with material already dissected and prepared by the mind. The question is therefore whether the compelling force which is inherent to logic — the force of the spirit manifested in the act of judgement — cannot be applied to something else. It is here that GENTILE, like many another, parts company with the scientists, and strikes the trail blazed by HEGEL. For better, for worse, the modern world is committed to finding out what there is at the end of that trail.

The logic of the abstract is not all of logic, says GENTILE, there is also a logic of the concrete. Since this is the hub of his system, and has been dismissed as unintelligible by otherwise intelligent critics, we think it deserves some elucidation.

What characterizes the logic of the abstract is its circularity, due to dealing with concepts as with objects. When the circle comes to a correct close, we are left with a tautology. And even if the circle extended to embrace what is called a spiritual reality, it would still admit it, whatever it be, as something presupposed : in other words, it would create another copy of nature, and this has occurred many a time. Thought is still a prisoner of its own idols.

But let us concentrate on that moment of thought which comes before any presupposition. There must be such a one. "Thinking presupposes nothing; but thought definitely presupposes thinking." And now comes a novel and radical distinction between the two. Thought in the act, *pensiero pensante*, undergoes a sea-change right in the nascent state, for it becomes "the thought that was", *pensiero pensato*, a mere object for successive thinking. We cannot think without grinding out this material which is alive no more. But it still is of the stuff of thought; it can be made to live again in the further act which synthesizes it with a new moment of experience, and in that fugitive, "concrete" instant it is again a living truth as it was at its birth: a new truth, for truth is ever new. It receives its values as truth, however, only from the act of being thought; it can condition that act but it cannot determine it, for the generative act ever transcends the engendered material. Hence, we may conclude that if truth in the ordinary sense can be frozen down into a formula tested by experiment, philosophical truth is ever on the wing, and resides only in the unlimited freedom of the act of thinking itself. An essential paradox, always implicitly acknowledged, and even by science in her own way. For science does imply a philosophy : it is an activity in which spirit and fact are locked in well-regulated contest. With GENTILE, it is as if the spirit walked out and tried to establish its own program in the ideal dimensions. The game is out, and facts appear from then on as intruders of opaque irrelevance.

If we take GENTILE's attitude we are left with the *act* of thinking as the whole of truth. On reflection, we shall find this quite natural. It should and does combine freedom with necessity, and that is the whole of the philosopher's dream as well as the artist's. That act is the *logos*, an ancient word resurrected : indeed, a whole ancient theme is being resurrected, and those who remember the *Theaetetus* will not wonder at this novel affirmation of true knowledge as transcending true opinion. This is still the old house that PLATO built, and GENTILE is now asking PROTAGORAS to come in.

The logos has been used in the past by metaphysicians of the Platonic school as transcending the act of thought, and providing a norm for it. But a relation of transcendence is a poetical one, accessible only to the contemplative mind. In the hard business

of philosophy, it cannot mean but that the one is alien to the other : and divided they have fallen, at the hands of HUME. There is no reason except intuitive to confer a value of truth upon an alien logos, and we are back at the point where we started. Certainty cannot be based on hunches. Whoever gets to realize this has to choose between idealism and scepticism. Truth implies a complete and spontaneous acceptance, an immanent free act of certainty. That is what we call knowing. And it is only in this freedom that morality is joined to logic. The true, the beautiful and the good are one at their inception, here is their link and their common power, and Man is the measure of them all.

The " pure act " of the spirit has no measure except in itself, so all valid measures can and do spring from it. It is *norma sui*, but its *norm* in its absolute purity is the universal itself... We have seen how logic can come of it, by the doctrine of internal relation. We perceive in thought a reality producing itself, reality as an activity. Indeed is there any other? Here, of a truth, it might be asked whether the question has a meaning. The factual immediate " reality " of nature becomes certain only through the mediate process of knowing, which establishes the relation of identity. By so doing it expresses the whole, center and circumference, of relational logic. But this is only the starting point of the Logic of the Concrete, which may well be termed the new metaphysics. The abstract logos is fundamentally a principle of identity : its law expresses the identity of differentiated thought. While the concrete logos expresses the difference in identical thought. The act of thinking is a continual differentiation from the thought that has just been thought, it does not break the link with it or it would be arbitrary, its very necessity lies in transcending it, in synthesizing it with something new and different. We perceive here the very law of life. From the awareness Ego = Ego we must pass, under penalty of freezing up, to a Not-Ego. What would be a contradiction in the logic of the abstract becomes a correlation, and a foundational one, in the logic of the concrete. A person lives only insofar as he changes while still remaining himself. Becoming has a logic of its own, it is a logic of integration. This is only another expression of that dialectical continuity, of that law of change which science has sought to grasp in its own way, by means of the

calculus. Philosophy expresses it, since the romantic era, by a dualization of identity, by the discovery of thought alienating itself from its original term in order to think. Outside of this dialectical rhythm of its own, thought cannot be said to have any contact with nature. It can describe it as an object : but then Nature will be correlatively static, and were it even the Heraclitean Fire itself; it becomes alive and real only insofar as we do something about it. Thought cannot mirror nature, it has only itself as a mirror, and only its past thoughts as a fuel for its unceasing flame. It can comprehend nature only by comprehending itself in everything. It is the subject dealing with the object and synthesizing it with itself : we see again how this logic of the concrete is nothing but action, it is one with the act of the spirit.

Let us draw one consequence only by way of conclusion. The object of abstract is multiplicity, which we try to unify. That is what the scientist is after. His name is legion, and his response is as unreflective as that of any good member of a team. Whereas concrete thought is the thought of a single consciousness and can have no multiplicity about it. Unity is the watchword, throughout the system. This symbolizes the integrated personality. Each act of thinking is the act of the entire concrete Ego. We will not touch here upon the grievous question of solipsism, which would require a treatment all by itself. We think that can be faced. Besides, the poet and the existential philosopher are far more severe solipsists, and nobody appears to mind. But there is another and more serious consideration. This all-embracing attitude which " comprehends all the others without being comprehended by them " and claims to deserve alone the name of philosophy, takes place explicitly *in interiori homine.* Not, of course, in the empirical person which is brushed aside (another inevitable paradox) but in the spirit of the ideally isolated Thinker. The Concrete Logos inhabits a perplexing world of inconcrete people. Herein, we venture to state, lies its fundamental renunciation both of science and of society.

GENTILE would strongly protest against such an inference, but it cannot be denied that somehow both science and social existence seem to be utterly sterilized in his scheme, even although official recognition is granted to their necessities. They simply will not stay put within the frame. We have seen why. You

cannot pretend to recognize a game and at the same time ignore the existence of the opponent : the teams dissolve of themselves. Science is intersubjective, its place is *inter homines*, here is the source of its irrepressible philosophical independence and value. The developments of the whole situation are fairly obvious.

GENTILE, it goes without saying, is far more consistent than the scientist. It is his business as a philosopher to be. For everything he finds the proper place : for Man, for the State, for God, for Nature. It is a feast of the understanding; the seats are set, each one nicely labelled, but no one seems to arrive. At long last, in stalks the Statue of the Commander. He comes for the State, which never passes up an invitation.

There is a Nemesis for coherent philosophies, as for all thoroughgoing things, and GENTILE has been inviting it all along. What we get out of him, as never before, is the fundamental alternative between the hopeless straining of the scientist after the secret of nature as revealed in the cosmos, and the resolute faith of man that there must be a certainty to provide the norm for his action. If we look for truth, we cannot find it in the cosmos. The known transcends the knower, and if our judgment must be synthetic, as GENTILE has proved it must, we even have to renounce the hope for any true judgements about the world. We may perceive it poetically, we may solve it existentially, or we may develop working hypotheses for whatever action we like — but we may not *know* it. Again, this has been stated many a time, but never so consequently. The science of nature here appears condemned to irremediable inferiority. This cosmological surrender is meant to pay for what GENTILE considers his great asset, a vision of truth springing from moral freedom. We stand to choose between truth, if it is to be universal and necessary, and assured knowledge of anything transcending the act of thinking. These two stand as what a physicist might call conjugate concepts.

What can the philosopher hope for? Is a clear statement of the sacrifice and of its measures enough to disarm Nemesis? It seems to come to this : Whether philosophy is entitled to such a knowledge and such a certainty as GENTILE has been eloquently proclaiming all along. There is a dark and awesome pitfall here,

that the mind is not yet able to plumb. BERKELEY's riddle on the validity of reason has never been solved. It might very well be that to look for certainty in the act of the spirit, so defined, is to take ready counters for possible coins. It might well be that the search for a Concrete Logo-centric Ego should turn out a goblin hunt. Nemesis may still be waiting around the corner : she seems to be lurking already in the hopeless paradoxes in which GENTILE the man has found himself enmeshed. We mean GENTILE the man of action and political thinker, even more than GENTILE the educator.

As Dr. HOLMES points out, there is an interesting parallel to be drawn between the PLATO of the early dialogues and GENTILE. Both draw a philosophical circle that leaves out the cosmos. The great difference between the two is that GENTILE's doctrine is such that we may be sure he will never write his *Parmenides* and eventually his *Timaeus* unless he completely renounces his actual idealism. For it is the essence of actual idealism that it admits of no intercourse with the universe around us as such. This should affect only the scientific value of the system, but, strangely enough, it reaches deeper than that. And here, too, we cannot help feeling that this philosophy provides an important test. For, notwithstanding its forcible demonstration of the moral nature of reality, it will never be able to construct its *Republic* either. It is not that GENTILE avoids worldly problems. In fact, he insists on being right in the midst of them : he believes in them as providing the only reality for his actualism. But the developments of his doctrine in action have proved so embarrassingly lunar and irrelevant that it is best to draw a chaste veil of silence. It is at this point that the irony of Fate overtakes idealism at last. For the unique Act becomes demonstrably, in the light of common day, actual passivity. As with HEGEL, but even more so. Rational, persuasive, albeit half-hearted yielding to the winds as they list. Dr. HOLMES merely hints at the danger : " this kind of philosophy seems to open the way to every kind of impulsive and irrational judgement in the name of truth." So, maybe, it should not do according to the most favorable interpretation, but so, actually, it does. There *is* a moral check implicit in the system, it comes out as personal responsibility, in its most absolute sense. But even that does

not appear to provide a firm hold in the ever-growing flood of the ever-present Act. And there is no appeal from actuality for actualism. So that here it is that we are entitled to found valid reasons both for acquiescence and for distrust. Actual idealism is as perfect and comprehensive a philosophy as can be obtained. But in its very formal perfection it partakes of what VALÉRY would have called, " la pureté du non-être ".

(*Harvard University*) GEORGE DE SANTILLANA.

A study in the analysis of complex scientific manuscripts

Sloane 3457 : An important alchemical manuscript

Sloane 3457 of the British Museum appears to be a very important alchemical manuscript. Not only do the contents of its 487 small leaves constitute a voluminous collection of treatises and recipes, but for many items it is the only manuscript in the British Isles, according to Mrs. WALEY SINGER's catalogue, and for some of these it may be the only text extant anywhere. I know of no other copy of the *Reformatorium magnum lapidis philosophorum* which PETRUS VOLCACIUS of Ragusa put together " from the sayings " of RAYMOND LULL and which is a substantial and well arranged treatise covering some twenty-six leaves and forty odd chapters. Sloane 3457 alone seems to contain a *Composition of the Mineral Elixir* under the name of ALBERTUS MAGNUS divided into fifteen operations, a briefer *Practica* attributed to CONRAD, archbishop of Prag, and a " Composition of the Stone according to the method of ARNALD OF VILLANOVA from mercury alone." Only here do we find ascribed to master ORTHUANUS or ORTOLANUS a work of seven days (1), and a work of a master DURANT or DURANS " which he often performed in the hall of the king of Castile " (2). It introduces to us such alchemists as

(1) The five items thus far mentioned are catalogued by DOROTHEA WALEY SINGER, *Catalogue of Latin and Vernacular Alchemical Manuscripts in Great Britain and Ireland dating from before the Sixteenth Century*, 3 vols., 1928, 1930, 1931 (henceforth to be cited as DWS and by entry rather than volume and page), Nos. 273, 181, 308, 240, 167. I shall later note some divergences therefrom in my readings of the manuscript.

The old topical catalogue of SAMUEL AYSCOUGH, *A Catalogue of the Manuscripts preserved in the British Museum hitherto undescribed consisting of five thousand volumes...*, London, 1782, merely lists our manuscript as an alchemical miscellany without distinguishing any of its particular authors and titles.

(2) Sloane 3457, fol. 206 : DWS 344.

GILBERT the cardinal, PETER OF NAPLES, JOHN OF APULIA, and NICHOLAS OF FLORENCE. It adds a *Practica* to the known ascriptions of alchemical tracts to Senior.

Besides such items this manuscript contains a great mass of collected recipes, anonymous tracts, and alchemical processes which appear to have been gathered by the fifteenth century writer or owner of the manuscript and in their present form to be peculiar to it, although upon closer analysis they would probably be found to have many features in common with other such collections. While Sloane 3457 thus seems in large measure to be *sui generis*, it at the same time contains enough well known alchemical treatises and extracts from others to assure us that it is a genuine bona fide collection and not a new fabrication. Its purpose and contents furthermore seem predominantly practical. It appears to be the combined library and casebook of an actual alchemist, in part copied from books, in part perhaps learned from others by word of mouth or the result of his own thought and experience. The occasional inclusion of recipes and other matter in German — no other vernacular language is employed — suggests that this was the native tongue of the writer or owner of the manuscript.

The old longhand catalogue of the Sloane manuscripts (3) divided our manuscript into sixty-two component parts. Mrs. WALEY SINGER in her catalogue of medieval alchemical manuscripts in the British Isles has distinguished ninety-one items.

(3) By the old longhand catalogue of the Sloane MSS I refer to a set of volumes of which the very existence seems to be unsuspected by many students of manuscripts. It is found in the Reading Room, Circle 84*a*, *not* in the Students Room, Dept. of MSS, of the British Museum, and is a continuation of an old printed catalogue or set of proofs which cover Sloane MSS 1-1090. Nothing further seems to have been printed until SCOTT's Index to the Sloane MSS. But the catalogue to which I refer is not an index but a regular catalogue taking up manuscript after manuscript and item after item. The first of the set of volumes to which I refer bears the title, " Catalogue of Additional Manuscripts : Sloane 1091-1598 " and the further explanation, " The present and eight following volumes contain a Catalogue of the Sloane MSS in continuation of the portion already printed and brought down to the last number. The descriptions have not been revised. Sept. 1st '73. E. A. BRUSH (?)." The last of the set of volumes catalogues Sloane 4100 as its last entry. Although called " Catalogue of Additional MSS," this longhand catalogue really deals exclusively with Sloane MSS and has no identity with the subsequent printed catalogues of Additional MSS in the British Museum which all carry higher numbers.

Personally I should be inclined to distinguish a good many more, as the rest of this article will show, while if one attempted to list separately each individual recipe which did not form part of a definite treatise, the number of items would perhaps reach four figures. Mrs. SINGER's catalogue appears to have been drawn up independently and without use of the old longhand catalogue. It not merely sometimes has several entries to correspond to one number in the older catalogue of the manuscript, as one would expect from its ninety-one as against sixty-two items, but less often has a single entry corresponding to two or six numbers in the other (4). Many of the items in the longhand catalogue are described by the vague and evasive formula, " Processus alchemici varii " or " Processus chemici et alchemici ". Over half the contents of the manuscript are so described, there being three such stretches of text of nearly fifty leaves each. Mrs. SINGER's catalogue similarly employs the equally vague designation, " Collectanea alchemica," or no title at all, for a somewhat smaller amount of text but subdivided into nearly twice as many chunks of lesser size.

This discrepancy of two previous cataloguers as to the number and extent of such items suggests what is the case, namely, that these sections of the manuscript possess little or no individuality or organic unity of their own but are arbitrary divisions which fall between treatises which have been more definitely identified and satisfactorily described. They really represent merely those portions of the manuscript which have been left virtually uncatalogued and unidentified. If incipits are given for them in the aforesaid catalogues, these apply only to the first page or so, or first paragraph or so, of the leaves in question and are followed by other anonymous tracts or notes or extracts or recipes with equally important or unimportant incipits of their own. The entire manuscript is in a real sense an alchemical collection. But it cannot be divided up into subordinate collections which have been made by this man or that, or by the same man at one time and another. There is nothing to indicate this. They are not

(4) Thus DWS No. 688 covers fols. 151-165, which are divided between items 17 and 18 in the longhand catalogue, while DWS No. 689 covers items 23-28 inclusive of the older catalogue.

distinguished by being written in different hands (5). They are not units but arbitrary sections of the manuscript. The real units are the recipes, operations, and extracts of which they consist.

The problem of cataloguing such a manuscript is one of great difficulty and is one which cataloguers of medieval manuscripts should face and solve sooner or later, since not only other alchemical but many medical manuscripts are of this sort : collections of a large number of recipes, operations, extracts, and passages as well as longer treatises. Indeed, somewhat the same characteristic applies to manuscripts in every field. What shall be the unit employed in cataloguing an alchemical manuscript like ours, the treatise or the individual recipe ? If the latter, several hundreds of entries would be required for complete description of this codex alone — a gigantic and expensive task from which both the old longhand catalogue of additional Sloane manuscripts and the catalogue of alchemical manuscripts in the British Isles not unnaturally shrank. Yet, as we have shown and shall further illustrate, it is doubtful if considerable sections of the manuscript can be satisfactorily catalogued in any other way. And in the past history of alchemy and chemistry and metallurgy, or medicine, pharmacy, and surgery, the particular process or operation, recipe or cure, may have as great importance as a longer theoretical treatise.

Our manuscript bears a general resemblance to that at Paris recently described by CORBETT (6) in its apparent borrowing of recipes from various persons mentioned by name and hailing from places widely separated, and in its containing a number of personal statements, although it has no account of extensive travel — whether actual or fictitious — to compare with that of the Bibliothèque Nationale manuscript (7). There is a fixation and congelation of mercury by master IOHANNES CASTELLANUS OF

(5) Possibly one or two works written in other hands have been embodied in his collection by the maker of our MS (see fols. 151r-162r and 395r-400r) or additional recipes been inserted later. But in the main the MS is a continuous whole, with new treatises often beginning without break in the middle of a page, with a contemporary numbering of the leaves in Roman numerals and a topical index based thereon (at fols. 463r-479r).

(6) JAMES CORBETT, " L'alchimiste LÉONARD DE MAURPERG (XIV^e siècle) : sa collection de recettes et ses voyages," *Bibliothèque de l'École des Chartes*, 97 (1936), 132-41.

(7) BN 14005, ff. 119-31.

VALENTIA, a knight and doctor (8). There is a very good confection of gold by JOHN THE FAITHFUL (9). A recipe for making good gold is " according to a certain FRANCESCO OF FLORENCE " (10). " A certain Englishman," we are told, " said seriously that in this art copper should not be used as the imperfect body but pure silver " (11). The art and method of master NICHOLAS, who works for the duke of Brabant in Brussels (12), are recommended in making gold and silver of good quality and proved malleable. We are told what " Master UDALRICUS writes to doctor RICHARD " (13), while two recipes, one in German and one in Latin, are taken " from the book of master Cfurstenstein " or G. FÜRSTENSTEIN (14). A master RUPERT OF CONSTANTINOPLE is twice cited (15). There is a bit from a " plebanus in Belma (?) " on the transmutation of iron into copper (16), a process received from a regular clergyman of holy life (17), and more than one deathbed revelation of an alchemical secret (18). Besides the contribution of JOHN THE

(8) Fols. 125v-126r: " Fixacio et congelacio M. pondus et lunam fixat in aurum album. Recipe mercurium mundatum per totum.../... et dicitur aurum album. Hec magister IOHANNES CASTELLANUS DE VALENTIA miles et doctor etc." This name does not appear in DWS.

(9) It occurs twice at fols. 128r and 171r. Both are noted by DWS 687, 689.

(10) Fol. 128r : noted by DWS 687.

(11) Fol. 129v, " Quidam anglicus dixit seriose quod in hac arte non debet poni es pro corpore imperfecto sed vera luna."

(12) Fols. 131r-132r. So the old longhand catalogue interprets the words in cipher.

(13) After the words, " Magister UDALRICUS scribit doctori RICHARDO sic " as quoted by DWS 687, the text opens, " Amen. Dico vobis, domine doctor R., Nulla aqua naturaliter reductiva speciem metallicam dissolvit...".

(14) Fol. 138r-v. The latter is the reading suggested by DWS 779B.

(15) Fol. 184r, " Ad faciendum solem de venere magistri RUPERTI DE CONSTANTINOPOLI;" fol. 281r-v, " Ad lunam ex marte magistri RUPERTI DE CONSTANTINOPOLIM (*sic*) meliorem naturali," opening, " Recipe laminas martis in spissitudine unguis quas extingue in oleo lini tribus vel pluribus vicibus..." and closing, "...et habebis lunam meliorem naturali de montibus. Et est augmentacio magistri RUPHI DE CONSTANTINOPOLIM (*sic*)." See DWS 385C Corr. and 385D Corr. (III, 1167), where "Ad sanendum solem..." is given as the reading instead of "Ad faciendum solem."

(16) Fol. 278r.

(17) Fol. 279r, "Opus habitum a quodam religioso sancte vite. Accipe limaturam subtilissimam auri..."

(18) Fol. 279v-280r, "Sequitur una vera tinctura data a germano in agone. Accipe salis petre et vitriolli romani..." Fol. 359v, "Practica quam dedit quidam agonisans amico suo..."

PREACHER or Dominican mentioned elsewhere, there is a recipe for fixing silver of PETER THE PRIEST and an elixir of JOHN THE BISHOP for gold (19). " A whitening of copper of ERASMUS which he stated as most certain " (20), would seem to be a recipe derived from some contemporary rather than copied from a past author. So would the " very good reductive powder " of a JOHN whose cognomen is perhaps MENGROS or ARENGROS (21).

Not infrequently the writer of our manuscript explains the provenance of his selections or gives details as to their relation to other treatises. There are excerpts from the booklet of the duke of Brabant (22). There is a *Practica* which was written after the treatise *De essentiis essentiarum* from Italy (23). There is a tincture " ex libro Rosliron " (24). There are extracts from " the book of divinity " (25) and from " a treatise of HERMES " (26). There is a passage which " I copied from a very old book. It was written at the end of the book " (27). There are numerous recipes from THEOPHILUS (28). Our author or collector states that he has found in another place and slightly different form the

(19) Fols. 364r and 369v.

(20) Fol. 386r, "Dealbacio veneris ERASMI quam dixit pro certissima." It is only seven lines long. It appears to be a different recipe from the "dealbacio veneris" which Judeus made for a lady BERNARDA DE POMEIACO at Toulouse, concerning which see DWS 147.

(21) Fol. 392v. It is only seven lines in length.

(22) Fols. 131r-132r.

(23) Fol. 132r, "Hec practica scripta fuit post tractatu(m de) essentiis essentiarum de italia..." DWS 687 reads "sunt" instead of "fuit" and "italici" instead of "italia".

(24) Fol. 150r. The spelling of the last word is uncertain.

(25) Fols. 208v-209r, "Ex librodi vinitatis verum sulphur sapientum," opening, "Recipe unam partem antimonii sublimati fixi et imbibe..."

(26) Fols. 318v-319v, "Ex tractatu HERMETIS," opening, "Quid sit sulphur sapientum? Est ovum (?) solis et lune et extrahitur per aquam..."

(27) Fols. 252v-254v, and again at fols. 418v-420v : "Ex vetustissimo libro scripsi et erat scripta in fine libri. Hec est operatio verissimi elixeris que primo fit per decoctionem.../... quia quanto puriora sunt elementa tanto plus tingunt." DWS 691.

(28) Fol. 272v, "Crocus ferri quomodo fiat per THEOPHILUM..." opening, "Nota crocus ferri quomodo potest fieri..." Fol. 273r, "Tingar compositio realis ex THEOPHILO," opening, "Recipe in Christi nomine..." Fol. 273r-v, " De tingar sub kubas (?) ex THEOPHILO," opening, "Novissime vero componamus oleum rectificatum in hoc modo..." Fol. 348r, "Solucio secundum THEOPHILUM," opening, "Est autem solucio in hoc alchemico opere..."; fol. 348v, "Alia eiusdem solucio"; fol. 349r, "Solucio alia predicti THEOPHILI."

Practica verissima which opens : " Take a pound of (Roman) vitriol, a (half) pound of sal nitri..." and he himself gives it twice in this manuscript (29). Mrs. SINGER has already specifically catalogued as a distinct item the *Practica universalis vie* which the writer of our manuscript says is found elsewhere in the book but here more fully (30). She has also identified this other occurrence with a *Via universalis* which comes later in the manuscript (31). ROSARIUS and ALBERTUS MAGNUS are cited in the former and fuller version (32). With this *Via universalis* is further associated in a third place in our manuscript a water of mercury which Mrs. SINGER has not indicated (33), although she has catalogued another "Preparation of water of mercury" from our manuscript (34) and other waters of mercury from other manuscripts (35).

One allusion seems to be made to the location of a work in the writer's study or laboratory : "You will learn about projection of the medicine in the book which is found on the wall with the foregoing *Practica*" (36).

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(29) Fol. 176v (written in red), "In alio loco reperi aliter (?) receptam signatam et eodem modo practicam viz. R. lb. vitrioli i salis nitri i lb et unum — (?) cinobrii"; (in black) "Practica verissima. R. lb. i vitrioli romani i lb. salnitri unam lb. a — (?) de cinobrio..."

Fols. 417v-418v : "Opus necessarium (?) et practica verissima. Recipe lb. i vitriolli romani mediam libram salis nitri unum — (?) de cinobrio .../... permanens perpetue et in ewum amen."

DWS 696 notes only the second of the two and reads "nostrum" rather than "necessarium."

I could not make out the abbreviated form for the word left blank preceding "of cinnabar." In the first two cases it looked like "fertis." Either some weight or amount of rust (ferro) or filings (frustis) of cinnabar may be meant.

(30) Fols. 240r-244r; DWS No. 690; old longhand catalogue, item 40. In the incipit I read "subtiliter limati" rather than "subtiliter lunati," which does not make sense.

(31) Fols. 373v-375v; DWS 565; not distinguished in the old longhand catalogue.

(32) Fol. 242r : "Ut dicit ROSARIUS, 'Nisi totum ascenderet (?) sursum...'; Item ALBERTUS MAGNUS dicit in centilogo..." What pseudo-Albertian alchemical work is designated as the *Centiloquium* I do not know.

(33) Fols. 329v-332v : "Aqua mercurii pro via universali fiat in hoc modo. Recipe vitriolli ungarici aut romani duo lb. sal nitri i lb..."

(34) Fols. 303v-306; DWS 457A.

(35) DWS 458, 459, 461.

(36) Fol. 222v, "De proiectione medicine reperies in libro qui inventus est in muro cum premissa practica."

It is not always easy to say whether utterances in the first person are by the maker of our manuscript or by another writer whom he is quoting or extracting, but the following instances may be noted. There is, we are told, another method of sublimation, and if anyone has run across it in the book of marvels, "I ask that he do not reveal the same, because from it increase praise and honor" (37). Or a recipe for the sublimation and fixing of antimony opens, "In such wise I have sublimated antimony and it became fixed as I well know..." (38). There is given the "Practica of my faithful associate," which seems to divide into three parts (39). There is a recipe which JOHN CLEMHANZEL or DEMHANZEL the preacher (or Dominican) brought "to me asserting that he had it as a gift from a certain goldsmith" (40). Or we are told what "I learned from the chancellor of the prince of Kaiserslautern (?)" (41). Our author could never find a nobler preparation than that of sulphur which we list elsewhere in more detail (42).

While it would take too long for our present paper, and possibly be hardly worth while in any case, to attempt to catalogue all the recipes contained in our manuscript, some of them possess definite titles or other distinguishing marks which may serve to identify them elsewhere and so enable students eventually to detect borrowings and connections between different manuscripts, and perhaps finally trace a recipe back to its particular source. One recipe, for example, for a tincture of gold or silver

(37) Fol. 134r. This "Alia sublimatio," which is brief, opens, "Accipe sanguinem humanum et distilla aquam cola et sepius solve in ea quantitatem (?) thuris..."

(38) Fol. 350v : "Sublimatio et fixio antimonii. Taliter ego antimonium sublimavi et fixum devenit prout ego scio..."

(39) Fol. 262r : "Practica socii mei fidelis. Recipe in nomine domini nostri Ihesu Christi unam partem corporis albi vel rubei .../... et prima pars operis est terminata." On fol. 262v follow paragraphs headed "Augmentacio," "Secunda pars," and "Tertia pars de crescentia." At fol. 263r this item seems to end, "...Tunc appone de luna beneficio salium (or, sulphuris) volgarum."

This *Practica* is not noted by DWS or the old longhand catalogue.

(40) Fol. 338v, "Dominus Johannes (?) lemhanzel predicator mihi contulit asserens a quodam aurifabro dono habuisse," opening, "Recipe sal ar. partes ii salnitri quintim i..."

(41) Fol. 258r, "Didici a principis de lutrio Cancellario. Ipse dixit quod ipse cum i lb. plus facere velit..."

(42) Fols. 285v-286r : see below, p. 386 n. 51.

is entitled *Scorpius* (not *Scorpio*) both at its beginning and end (43). *Luna Indorum* and *Luna Grecorum* are other captions which have already been remarked in Mrs. SINGER's *Catalogue* (44). An oil of human blood which occupies four pages may be worth distinguishing (45); although the blood of another animal may be substituted. A most potent water of HERMES which dissolves any iron and stone may also be recorded (46).

Yet other recipes possess a memorable individuality like the "Marvelous Cure for Drunkenness" (47), or the cogent aphrodisiac that immediately follows it and which will further turn quicksilver into silver (48). Slightly less striking is the "Science of the Mastery of a water which is most strong and most virtuous beyond measure" (49). Fairly distinctive too seems the full description of a water of tartar and an oil of the same which is "valid for all particular operations" in transmutation and "is the

(43) Fols. 124v-125r : heading, "Tinctura auri aut argenti super Mercurium (I thus interpret the abbreviated forms, 'sr' M' rather than as 'seu Mercurii' as given by DWS 687, the aim being — I take it — to give Mercury a gold or silver color) verissima et probata que dicitur Scorpius." Incipit, "Recipe aluminis ii lb. sal nitri i lb. salis armoniaci i lb..." Explicit, "...et iste est lapis qui dicitur Scorpius perfectus."

This definite ending, not noted in DWS 687, serves to mark off the *Scorpius* from the other matter following to fol. 130v, where occurs the first explicit noted in DWS 687.

(44) Fol. 129r and 129v : see DWS 687.

(45) Fols. 134v-136r : "Oleum sanguinis ad rubeum et coagulacionem Mercurii. Oleum sanguinis hominis et cuiuslibet alterius animalis ita fit. Recipe de sanguine hominis per se quantum vis seu alterius animalis. Ipsum loca in vase vitri quod cooperi et ipsum loca in fimo calido ubi stet septem diebus vel amplius .../... hoc enim oleum sanguinis hominis pretiosum est et laudabile multum." DWS 687 notes only the explicit.

(46) Fol. 124r : rubric, "Aqua Hermetis potentissima que sua potentia omne ferrum et lapidem solvit"; incipit, "Recipe aluminis partes ii nitri partem unam vitriolli partem unam arsenici sublimati partem unam adde modicum de oleo tartari omnia pulverisentur..."

(47) Fol. 123r : see DWS 686A.

(48) Fol. 123r-v : "Ut fiat quinta essentia appropriata luxurie id est ad coeundum vigesies cum muliere sine nocumento corporis ita quod ista medicina cogit hominem ad luxuriam. Recipe dyasatirion oz. iii zinziberis oz. ii gariofolorum oz. i satirion..."

(49) Fols. 232v-233r : "Scientia magisterii aque fortissime et virtuosissime super modum," opening, "Creator archanorum deus tot mineralia condidit in natura ut nec intellectus..." and closing, "...valebit ut prius serva illud quia secretum est."

best confection ever found by any masters ancient or modern" (50). "A very good preparation and fixing of sulphur" is probably a more common title, but at least its incipit and explicit are clearly marked (51). Instructions are given how to recover the gold from cloth of gold by reducing the fabric to ashes, applying quicksilver, blowing off the impurities, and straining and evaporating the rest (52).

A number of items in our manuscript are concerned primarily with antimony. These began to attract my attention at fol. 196, on whose recto is a "Tincture from antimony alone" (53), followed on the verso of the leaf by a "Whitening of antimony" (54). After a red tincture which seems to have no connection with antimony comes a recipe for making *a* water from mercury sublimate and antimony (55). After several short recipes, in which antimony does not figure and two of which are about crystal, there occurs a note that *aqua vitae* removes the redness from antimony (56), and a "Solution of antimony" (57). Later in the manuscript two oils of

(50) Fol. 276r-v : "Aqua tartari et oleum ipsius simul et semel de una substantia et sua propria essentia valens ad omnes operaciones particulares tam in albo quam in rubeo. Et est melior confectio que umquam fuit per aliquos magistros antiquos aut modernos artis in opere ipsius alchimie inventa." Incipit, "Accipe tartarum crudum et optime tritum..." Explicit, "...Et veneris xxx partes (?) mirabiliter."

(51) Fols. 285v-286r : "Sulphuris preparacio et fixio optima ad omnia quecumque volueris laborare in hac arte quia nobiliorem preparacionen cuicumque nequaquam potui invenire. Recipe sulphuris commune (*sic*) quantum vis et dissolve .../... et poteris cum eo operare quid volueris in vera via."

(52) Fol. 390v-391r, "Reductio et aggregacio auri ex vestibus textis auro". Since the instructions are brief, I reproduce them in toto : "Recipe ollam novam fortem bene et ignias bene carbonibus ut sit bene agnita (ignita?) tandem proice rem auro intextam et mitte cremari in pulverem excipe carbones et impone argentum vivum bene hinc unde movendo. Sic accipiet argentum vivum aurum vel argentum quod in panno fuerat. Postea suffla cum folle aut ore immundicias ab argento vivo et mittas per coreum aut barchanum (?) pertransire. Et quicquid interius manebit hoc impone ad tigillum et evaporabit ab eo argentum vivum et aurum permanebit."

(53) Fol. 196r, "Tinctura ex solo antimonio," opening, "In primis sublima antimonium ex seipso deinde fac aquam fortem..."

(54) Fol. 196v, "Dealbatio antimonii," opening, "Recipe cuperose 1 lb. salis nitri 1 lb..."

(55) Fol. 197r, "Ad faciendum aquam ex Mercurio sublimato et antimonio," opening, "Accipe partem Mercurii sublimati Antimonii 1 partem salis armoniaci..."

(56) Fol. 198r, "Nota quod aqua vite extrahet rubedinem ab antimonio..."

(57) Fol. 198r, "Solutio antimonii," opening, "Recipe communem aquam fortem..."

or from antimony (58) are immediately followed by the passage from JOHN OF RUPECISSA on extracting the fifth essence from antimony (59). At fol. 238v is a short recipe to prevent the fixation of antimony (60). Over a hundred leaves further on in the manuscript a "Sublimation and Fixing of Antimony" is written in the first person, apparently by the compiler of the manuscript himself (61), while still further along is a *Practica* of JOHN SCRIPTOR on antimony (62). A few leaves beyond this is an artificial antimony (63).

To salts our manuscript devotes some consecutive attention, giving two ways of making *sal alembrot* ("alemprot") (64) and discussing the salts of metals and their extraction (65).

A cluster of recipes in which urine forms the leading ingredient begin at fol. 234v. The urine of boys is usually required (66). One recipe is called an unknown method.

Recipes for *Aqua vitae* or water of life are found in this as in many an alchemical manuscript and may be noted, since they have not been distinguished either by the old longhand catalogue

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(58) Fol. 228v, "Quando habes oleum antimonii tunc preparabis mercurium..."; fol. 229r, "Oleum ex antimonio", opening, "Recipe antimonii unam partem et unam partem tartari calcinati..."

(59) At fol. 229v.

(60) Fol. 238v, "Quod antimonium non finget".

(61) Fol. 350v, "Sublimatio et fixio antimonii", opening, "Taliter ego antimonium sublimavi et fixum devenit prout ego scio..."

(62) Fol. 426v, "Practica IOHANNIS SCRIPTORIS de antimonio". The name is given as Scripton in the old longhand catalogue, item 56.

(63) Fol. 434r, "Antimonium artificiale", opening, "Considera primo si rubrica est venarum lune..."

(64) Fols. 290v-291r.

(65) Fol. 291v : "Qualiter sales metallorum tingunt et de extractione eorundem"; "Sales metallorum extrahes cum aqua dulci". On fol. 292r are various Notae concerning the salts of metals.

(66) Fol. 234v : "Collige urinam virginear .n vase..." are the opening words of a recipe which fills more than half of the page. At fol. 235r-v, "Recipe de urina puerorum de decem annis .../... hic potest tibi cito donare. Amen." At fol. 235v an "Aqua ad album in ere", opens, "Recipe de urina puerorum distillata cocta..." At the very bottom of the same page is the heading, "Urine ignotus modus conficiendi et tincture ex lapide eiusdem", opening at the top of fol. 236r. "Recipe urinam — (a word in cipher) in magna quantitate..." On the same page is the heading, "Preparacio urine puerorum", the text opening, "Accipe ipsam et fac stare quanto diutius tanto melius..."

or the more recent catalogue of Mrs. SINGER. There are three at fol. 190r-v, while at fols. 234v-235v is a longer "Water of Life of the Philosophers" whose incipit we also cite in another connection (67).

Recipes for making potable gold occur more than once (68) and again have not been noticed in the previous catalogues. Sandwiched between two such recipes for making potable gold is a water which dissolves gold and precious stones (69), while one of the recipes for potable gold with slight variations will render gems potable too (70). After which our text digresses to inform us that precious stones have marvelous and diverse effects in curing various ailments, and that the blood of a goat, gall of a crow, and the white worms found in rotten wood, mixed together with strong vinegar, soften specious stones. Somewhat similarly a brief note in another part of the manuscript affirms that the herb vervain makes silver from lead and tin and was revealed by the spirit. "But it should be collected in March" (or, May) (71).

Colors receive considerable attention in our manuscript, especially in that part of it between leaves 342 and 388. Here, *inter alia*, we are told how to make *viride es* (72), *Hispanicum* (73), *viride grecum* (74),

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(67) "Aqua vite philosophorum. Recipe de urina puerorum de decem annis .../... hic potest tibi cito donare amen."

(68) Fols. 189r-190r : rubric, "Aurum potabile", incipit, "Recipe tormentille viridis si haberi possit .../... erit aurum potabile". Fol. 259r, "Recipe laminas auri seu tabulas quas habere solent pictores .../... tunc in fundo manebit oleum et (h)oc erit aurum potabile.

(69) Fol. 259v, "Aqua solvens aurum et lapides preciosos. Accipe salis armeniaci (armoniaci ?) lb. i et salis nitri lb. i.../... et fiet aqua clara".

(70) Fol. 260r, "Aurum potabile sic facies. Recipe istius aque libram et distille eam sine fecibus .../... eodem modo potes facere potabiles omnes lapides preciosos non ponendo ipsum Mercurium sed solum sulphur. Recipe ergo quemcumque lapidem preciosum et tere subtilissime in porphiro .../... et habebis lapidem tuum preciosum potabilem sicut habuisti aurum".

(71) Fol. 342v.

(72) Fols. 342v-343r, "Viride es sic fit. Lamine cupree suspendantur supra vaporem aceti fortissimi..."

(73) At fol. 343r-v there are three recipes headed respectively, "Hispanicum", "Aliter", and "Alius modus Hispanici". Only the last of the three is noted in DWS 692 D.

(74) Fol. 343v, "Viride (not 'Vide' as in DWS 692D) grecum pro arte optime valet. Recipe laminas cupri ad quantitatem palme..."

'bonum zinimar' (75), azure (76), *crocus* (77), white lead (78), and *album grecum* (79).

It may be well to note some divergences in readings of the text of the manuscript between the old longhand or my own notes and Mrs. SINGER's catalogue. In the case of the titulus or introduction to the 1386 version of the *Practica* of ORTOLANUS, not only should the *Parisium* of DWS 169 be changed to *Parisius* (as it already has been in T III, 692) but the *et* before *quantum compendiosius* should become *in*. As for the cognomen of the JOHN who compiled this version for CONO OF FALKENSTEIN, SINGER suggests DOMBELAY, the old catalogue gives DUMBELEY, while my notes have DUMBELEY or DOMBELEY. Instead of SINGER's *excellentissimi principis patrum* the longhand catalogue reads *serenissimi principis patris*. The abbreviated adjective superlative begins with an S but I agree with Mrs. SINGER's *patrum*. The ensuing text of the *Practica* does not differ essentially from that printed by ZETZNER, IV, 912-34.

In the "Composition of the Mineral Elixir according to ALBERTUS MAGNUS", DWS 181 gives the number of operations required as fourteen, but the manuscript not only says "fifteen" (XV, not XIV) but proceeds to specify them as made up of eight from spirits, three from perfect bodies, three from imperfect "and one in projection of the elixir" (80). It also closes with the

(75) Fol. 345r, "Ad faciendum bonum zynimar. Recipe laminas eris et madefac eas..."

(76) Fol. 360r, "De lazurio".

(77) Fols. 376v-377r, "Nota de croco. Albertus michi ostendit crocum ferri quem dixit se fecisse sic. Recipe limaturam lotam in aqua tepida bis vel ter..."

(78) Fol. 388r, "Plumbum facere album. Recipe limaturam eius, pone in olla..." After this recipe of nine lines follows a still briefer one of four lines, "Celerius facies ita. Recipe calcem plumbi et ignitum proice in acetum..."

(79) Fol. 388r, "Optimum album grecum. Cortices ovorum calcinatas coque in aceto..."

(80) I give the passage in question as printed in DWS 181 (fols. 109r-113v) with the correct readings in parentheses. "Elixer (Elixir) ex mineralibus requirit XIVm (XVm) operationes, octo scilicet ex parte spiritum (spirituum), tres ex parte corporum perfectorum et tres ex parte imperfectorum et manu (unam) in proiectione elixiris supra corpus imperfectum..."

The pi of "manu" for "unam" has perhaps been responsible for a miscalculation as to the number of operations.

The rubric, "Compositio Elixeris (the spelling of this word varies in the MS) mineralis secundum ALBERTUM MAGNUM Theutonicum et summum philoso-

fifteenth operation. The *Practica* of CONRAD, archbishop of Prag, enabled him to live for many years while he was fighting against the Bohemians with three hundred horse and not while he was "philosophizing against the Bohemians with three hundred horse", as DWS 308 has it (81).

What DWS 958 catalogues as "Sigillum Hermetis" should rather be expressed in the plural, since there are given about a dozen seals or methods of sealing or different versions of the "Hermetic Seal" (82). At fols. 105v-109 the "Compositio lapidis secundum viam ARNALDI DE VILLANOVA ex solo mercurio", would seem to be by some follower in the master's footsteps rather than by ARNALD OF VILLANOVA himself as catalogued in DWS 240. The work of seven days by ORTHUANUS, which DWS 167 represents as covering fols. 220v-239v, is extended only to fol. 222v by the old longhand catalogue and this appears to be correct (83).

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phum", has also been misread in DWS 181, which gives : "ALBERTUS MAGNUS. Composicio elixeris mineralis *or* Summum philosophorum", apparently confusing "summum" with a Summa and turning "the supreme philosopher" into a "Summa of the philosophers", while the description of ALBERTUS MAGNUS as a Teuton is omitted.

(81) Fol. 168v, *Preliando*, not *philosophando*. Also not *quoc* but *quia* "redditus suos receperant Boemi".

(82) Fols. 294r-295r. I give the various captions : "Sigillum Hermetis, Alius modus.. Aliter. (294v) Aliter. Iterum aliter. Sigillum Hermetis ad sigillanda vasa. Lutum optimum ad vitra (?) ne spiritus evadant. Lutum sapientiae. Ad reparandum vitrum. (295r) Ex alio sigillum Hermetis. Sigillum vasorum. Aliud."

(83) At fol. 222r we read, "Hoc est opus vii dierum sub uno regimine completum. Si tunc volueris istam inclitam medicinam augmentare", and at fol. 222v, "...Et hec est vera augmentacio in pondere et virtute usque in infinitum. De proiectione medicine reperies in libro qui inventus est in muro cum premissa practica."

Then follows a "Practica secreta" (rubric) opening, "Pondera xii et quodlibet corpus..." which seems to extend to fol. 228v and to end there thanking God. This is item 38 of the old longhand catalogue.

What sound like extracts from JOHN OF RUPESCISSA and a large assortment of recipes then occupy the leaves to fol. 239.

Index of Incipits

	Sloane 3457 Fol.
Accipe ipsam et fac stare	236r
Accipe limaturam subtilissimam auri	279r
Accipe partem mercurii sublimati antimonii	197r
Accipe salis armeniaci libram unam	259v
Accipe salis petre et vitriolli romani	279v
Accipe sanguinem humanum et distilla	184r
Accipe tartarum crudum et optime tritum	276r
Ad faciendum solem de venere	184r
Celerius facies ita. Recipe calcem plumbi	388r
Collige urinam virgineam in vase	234v
Considera primo si rubrica est venarum lune	434r
Cortices ovorum calcinatas coque in aceto	388r
Creator archanorum deus tot mineralia condidit	232v
Elixir ex mineralibus requirit quindecim operationes	109r
Est autem solutio in hoc alchemico opere	348r
Hec est operatio verissimi elixeris	418v
In primis sublima antimonium ex seipso	196r
Lamine cupree suspendantur supra vaporem aceti	342v
Nota crocus ferri quomodo potest fieri	272v
Nota quod aqua vite extrahet rubedinem	198r
Novissime vero componamus oleum rectificatum	273v
Pondera xii et quodlibet corpus	222v
Qualiter sales metallorum tingunt	291v
Quando habes oleum antimonii tunc preparabis	228v
Quid sit sulphur sapientum	318v
Quod antimonium non finget	238v
Recipe aluminis duo libras sal nitri unam libram	124v
Recipe aluminis partes ii nitri partem unam	124r
Recipe antimonii unam partem et unam partem	229r
Recipe aurum finatum vel lunam	381r
Recipe communem aquam fortem	198r
Recipe cuperose unam libram salis nitri unam	196r
Recipe de sanguine hominis per se quantum vis	134v
Recipe de urina puerorum de decem annis	235r
Recipe de urina puerorum distillata	235v
Recipe eneadis ut supra per omnia	378v

Recipe fidam bene et optime finitam 412v
Recipe in Christi nomine 273r
Recipe in nomine domini nostri Ihesu Christi unam partem corporis albi 262r
Recipe istius aque libram et distille. 260r
Recipe lacerti viridis eneadis 377r
Recipe laminas auri seu tabulas 259r
Recipe laminas cupri ad quantitatem 343v
Recipe laminas eris et madefac eas 345r
Recipe laminas seu tabulas. 259r
Recipe libram unam vitrioli romani 176v, 417v
Recipe libram vitrioli unam salis nitri unam 176v
Recipe limaturam eius pone in olla 388r
Recipe limaturam lotam in aqua tepida 376v
Recipe mercurium mundatum per totum 125v
Recipe ollam novam fortem bene et ignias 390v
Recipe sal armoniaci partes ii sal nitri 338v
Recipe sulphuris communis quantum vis 285v
Recipe tormentille viridis si haberi possit 189r
Recipe unam partem antimonii sublimati 208v
Recipe urinam 236r
Recipe vitriolli ungarici aut romani 329v
Sales metallorum extrahes cum aqua dulci. 291v
Taliter ego antimonium sublimavi 350v
Ut fiat quinta essentia appropriata luxurie 123r

Columbia University,
New York.

LYNN THORNDIKE.

The Elephantine Aramaic Papyri

These papyri were discovered at Elephantine (Aswan) some forty years ago. They have received a large measure of recognition, being for instance frequently cited in the Cambridge Ancient History of their period.

Some seven of these papyri are legal documents, duly signed and witnessed in the local Persian courts of Law. Their value is due to the fact that they have been doubly dated in terms of the local Egyptian solar calendar, and of a lunar calendar, presumably the current empire calendar. It was recognized that these double datings are in themselves equations, which, when correctly solved, should define the exact Julian date of each transaction, and incidentally of the regnal year of the reigning monarch.

An archeological discovery which can define a series of exact Julian dates is so unique that it deserves very special consideration.

But in order to extract all the information latent in these synchronizations, the evidence must be examined independently by three distinct groups of specialists.

In the first place the scholar. Various scholars have assisted in the spade work. See COWLEY's Aramaic Papyri of the 5th century B. C. (Oxford).

In the second place the scientist. His share of the work is to define the elements of this particular lunar calendar from the internal evidence of the synchronizations, and then to use these elements in the solution of the equations and to prove the Julian dates obtained. But science exacts that this should be done with rigid impartiality independently of all preconceived opinions.

As a matter of fact these equations have been examined by Mr. KNOBEL, Dr. FOTHERINGHAM and others, but no authoritative decision has been obtained (1). Nor is this surprising, for all

(1) See Monthly Notices, Royal Astronomical Society, March 1908, Nov. 1908, etc.

have assumed that the regnal year, that is the Julian B. C. date of each document, was already known. I suggest that the truly scientific course of fixing the Julian dates of these transactions by their own internal evidence has yet to be adopted.

This done, if neither scholar nor scientist can impugn the veracity of these legal documents, then the historian has a sure chronological foundation on which to reconstruct, if necessary, the true history of the period.

The equations as published by Mr. COWLEY are :

No. 5.	15 Xerxes.	18 Elul	= 28 Pachons.
No. 6.	21 Xerxes. accession Artaxerxes.	18 Chisleu	= 14 Thoth. (2)
No. 10.	9 Artaxerxes.	7 Chisleu	= 4 Thoth.
No. 13.	19 Artaxerxes.	3 Chisleu	= 10 Mesore.
No. 14.	25 Artaxerxes.	14 Ab	= 19 Pachons.
No. 25.	8/9 Darius.	3 Chisleu	= 12 Thoth.
No. 28.	13/14 Darius.	24 Shebat	= 9 Athyr.

Hitherto these problems of converting lunar to Julian dates have been complicated by uncertainty as to the exact application of the principles regulating the lunar calendar.

But as far as these particular documents are concerned, the internal evidence of the synchronisations defines two of these factors with precision.

As the number of days between any two particular Egyptian dates is always a fixed quantity, valuable information can be obtained from these equations altogether independently of the actual Julian dates, and this information must hold good whatever these dates ultimately may prove to be. Herein lies a check on the correctness of the solution.

The mean lunation

The Egyptian dates of No. 5 and No. 6 measure an interval of 2301 days.

2301 days = 78 lunations of 29.5 days.

Similarly from No. 6 to No. 10, (when the lunar dates are

(2) See COWLEY, page 17, Note on Line 1.

reduced to complete lunations) measures 2921 days, or 99 lunations of 29.5 days; and from No. 10 to No. 13 measures 3990 days or 135 lunations of 29.5 days.

But the total interval between No. 5 and No. 14 measures 11310 days or 383 lunations of 29.53059.

Here is evidence (1) that this calendar was based on a mean lunation of 29.5 days, (2) that the resulting error was corrected from time to time; and (3) that the true length of the mean lunation was known to the Royal Astronomers, and was used to correct the calendar when considered necessary.

The intercalary months

The comparison of the lunar and solar calendars also shows how many intercalary months had been inserted in each period.

From No. 5 to No. 6 was 6 lunar years and 3 months = 75 lunations.

The same Egyptian period = 78 lunations.

Therefore, in these particular seven inclusive years, there must have been three intercalary months.

In the same way the sequence of intercalary years, from the 15th year of XERXES to the 24th year of Artaxerxes, can be established.

Up to the year 1932 the rule fixing the 1st Nisan, and, incidentally, the necessity or otherwise for an intercalary month was open to argument.

In 1932 Mr. C. J. GADD of the British Museum discovered amongst its treasures a small ivory prism. He translated it, but the translation conveyed no apparent meaning. The story is told by Dr. LANGDON in the Schweich Lecture of the British Academy 1933, and by Dr. FOTHERINGHAM in "The Observatory" Dec. 1932.

This prism demonstrates that even earlier than the 5th century B.C., the new moon nearest the mean spring equinox had been reckoned as the 1st Nisan. Therefore the intercalary years of the Elephantine papyri should conform to this rule.

The new moon and the first of the month

There remains one other uncertain element of the lunar calendar to be fixed before it is possible to solve the true date of these

equations. For no solution can command respect if any essential factor may be manipulated to suit the argument.

In principle the lunation began with the new moon. This principle may be inferred from a statement quoted at the foot of page 18 " The Assyrian Eponym Canon," and also in L. WATERMAN " Royal Correspondence of the Assyrian Empire " (1930). Vol. XVIII, page 20, 21. Letter 744.

This statement proves that before it was possible to fix the day of new moon by calculation, the Royal Astronomers took advantage of any possible solar eclipse to correct the calendar and to fix the 1st day of a month. Otherwise it was fixed by observation, or by dead reckoning.

The equations indicate that this system of dead reckoning was continued for general purpose.

But when correction became necessary the hour of mean new moon was calculated. In such cases, the first of the month would conform to principle and would count from the sunset before, to the sunset after, the calculated hour. Thus any solar eclipse, if visible, would fall on the 1st of the month.

I venture to submit my own solution of these equations, based on GRATTAN GUINNESS' published lunar tables.

Column No. 1. Mr. COWLEY's papyrus number.
2. The regnal year.
3. The synchronisation.
4. The equivalent Julian date B. C.
5. The deficiency, if any.

1	2	3	4	5
5.	15 Xerxes.	18 Elul = 28 Pachons.	28 Aug. 410.	Right.
6.	21 Xerxes.	18 Chisleu = 14 Thoth.	15 Dec. 404.	3 days.
10.	9 Artaxerxes.	7 Chisleu = 4 Thoth.	3 Dec. 396.	5 days.
13.	19 Artaxerxes.	3 Chisleu = 10 Mesore.	1 Nov. 385.	2 days.
14.	25 Artaxerxes.	14 Ab = 19 Pachons.	11 Aug. 379.	Right.
25.	8/9 Darius.	3 Chisleu = 12 Thoth.	26 Dec. 455.	3 Tebeth
28.	13/14 Darius.	24 Shebat = 9 Athyr.	20 Feb. 449.	Right.

If these dates are correct the DARIUS in question must have been HYSTASPES, and not DARIUS NOTHUS.

In solving these equations I discovered that 25 Egyptian years

are within an hour or two of 25 lunar years + 9 intercalary lunations. Consequently there is more than one solution to each individual equation. The above table is the only possible solution, which I can find, which satisfies them all.

Hitherto the historian has depended on the Royal Canon of PTOLEMY for his broad outline of history. It seems almost heresy to suggest that any other witness should be examined for an independent evidence. Especially as this evidence apparently refutes the old established chronology of the Royal Canon.

But it must be remembered that as a witness to the facts of history, PTOLEMY lived about 700 years after the early Persian period. Secondly, he was a scientist of the highest rank, but he did not claim to be an historian also. Thirdly, he adopted his Royal Canon as a simple method of describing time elapsed. It has served his purpose so well that exact Julian dates have been assigned to his recorded observations, and all his lunar eclipses have been checked and verified.

But this does not guarantee that his Canon is anything more than a set of labels which may or may not be true, in whole or in part. In fact, if the Aramaic papyri are genuine legal documents, good in law, then the Royal Canon is not infallible history.

Both in the interests of science and history these equations should now be impartially examined by those whose opinions carry weight, and if possible their solutions should be published with the imprimatur of some recognized scientific society.

Tunbridge Wells, England. A. KENNEY-HERBERT (Lt. Col.)

A Philosophy of Catalysis

In 1835, BERZELIUS presented a new notion to chemistry. He united an already considerable number of chemical reactions differing in the substances involved and the products formed, which had one common feature : small quantities of matter, which apparently do not react stoichiometrically with the substances present, are necessary to get a reaction at all. This revealed a new force in matter, the catalytic force. When platinum causes hydrogen and oxygen to unite with liberation of much energy, or it decomposes hydrogen peroxyd, when the ferment diastase converts starch into sugars, when sulfuric acid transforms the alcohol with which it is gently heated into ether—we see the action of catalysts, i. e. substances causing, by their mere presence, chemical reactions which otherwise would not proceed so fast or at all.

Half a century after BERZELIUS' creation, scientific work on this strange chemical force started anew, and now, after a hundred years, gigantic industrial applications of catalysts are producing millions of tons, worth billions of dollars, of nearly all kinds of materials—fertilizers and oils, vitamins and ash-trays. But how far do we " understand " catalysis ?

There are innumerable investigations, published or buried in the offices of industrial companies concerning measurements of catalysed reactions as well as theories about the structures of surfaces and the formation of intermediate compounds; nevertheless there are no general laws which would enable the chemist to predict what substance will act as a catalyst in a new given case. From very early times we have the analogy of " love and hatred " between the elements, which offers a human aspect to explain chemical changes. No similar analogy seems available for the necessity of special and mostly indifferent substances to set affinities into action. How is this compatible with the principle of causality ? Enzymes, hormones and vitamins are fundamental catalysts in the chemistry

of organic life. Does this afford a physico-chemical solution of all the problems of life?

One of the most successful scientific explorers and inventors in the field of technical catalysis, ALWIN MITTASCH, discusses these questions in his recently published books (1). They are valuable contributions to a " philosophy of chemistry," starting, like every good scientific theory, from a specific corner and with a good deal of personal experience, describing facts and using quotations from other authors, in the same way as a treatise on chemical subjects uses the experimental data. Some decades ago, such a work would have been justly expected to praise the newly attained progress of science and to conclude that we are now in possession of all the facts and the complete comprehension of life on a sound scientific basis. Three roots for MITTASCH's different attitude may be found : the " Ganzheits "-philosophy, NIETZSCHE's critique of science and knowledge, VAIHINGER's system of " Als-Ob," of fiction.

In the light of the first, the chemical history of organisms is clearly seen to be only a part of its whole individuality. Life cannot be described in terms of chemical formula, because it is an irrational fact. Chemistry and physics contain the fundamentals for the utterances and outward appearances of life, but they are directed and governed by powers of a higher order. Catalysis is one of the means of which life makes use; life creates and coordinates the catalysts, every one of them acting according to rules, which we detect when measuring the isolated reactions. Catalysis is a special form of causality; for the old phrase : " causa aequat effectum " is one-sided and of only restricted validity. Catalysis reveals a causality of incitation. A catalyst may be detected by chance—as shown by history, its presence in a system of substances may be due to an accident, but once present, it acts according to causality.

But physico-chemical causality is only at the bottom of the " cosmos " (2); it corresponds to reason. At a higher level,

(1) " Über katalytische Verursachung im biologischen Geschehen," 1935.— " Katalyse und Determinismus, " 1938. IX + 203 p., 10 Fig. Verlag JULIUS SPRINGER, Berlin.

(2) P. 68 in " Katalytische Verursachung," p. 142 in " Katalyse und Determinismus."

feeling leads to the sensation of harmony. The next step discloses sense and organization to our intention. No insurmountable barriers separate these three elements of the " Ordnungs-Gefüge; " the " Wille zur Macht " underlies simple inorganic reactions in nearly the same way as in the most complicated politics.

Will and intention are human realities; are they any more than fictions when applied to the inorganic? " Unter einer naturwissenschaftlichen Fiktion verstehen wir hier eine gleichnishafte Darstellung mechanistischer oder psychistischer Art für ihrem Wesen nach unbekannte oder unerkennbare Verhaltensweisen (z. B. das geometrische Atommodell, die chemische ' Zusammensetzung,' die ' Lebenskraft ' ...)." (3) Entelechy, force, and even substance are fictions. The very model of the ancient notion of stable and lasting substance, the human body, is not stable and its chemical substance is ever changing; " every material particle is in reality only a guest of life." (4)

The unity of the organic individual is, therefore, not formed by its material—but by what else? The everlasting " Keimplasma " is not an identical substance, it cannot be expressed in terms of numbered atoms and molecules—but as what else? Is it Spirit or complex-causality governing a high order of systems of catalysts, and that not the material catalysts, but their rules of coordination?

It is one of the characteristics of modern science that it does not lead to resignations, but to limitations. Remember EMIL FISCHER who, by the successful work on the chemical constitution of proteins came to the conclusion that a synthesis of living protoplasm can be proved to be impossible. It had been predicted when knowledge was much scarcer. With all the wonderful discoveries of the material conditions for the development of the embryo, of sex, of growth and hereditary rules, the philosophically minded chemist MITTASCH recognizes that our generalizations are " fictions."

And yet there is the reality of industrial achievements and the reality of existence. Where then is the fiction? Does it reside in the philosophical thought? Is it not, in this case,

(3) " Kat. und Det. ", p. 99.
(4) *L. c.*, p. 115.

mere tautology to speak of fiction? This is my principal objection to this notion or doctrine. It is lacking in the solid fundamental from which it could separate and identify the realm of fiction.

So general are the problems to which a thorough discussion of catalysis leads. Constructing a line from the influences on simple inorganic reactions up to the significance of enzymes, virus and on to an ever increasing number of very special and incredibly active substances, we become aware of the importance of the coordination: As human will sets the aim for many of our actions, involving the regular play of innumerable catalytic reactions, may we compare will with a catalyst? Catalysts are not "free," that means, they do not act at random, but according to laws, they are "determined;" does it follow from an analogy that human will is free or determined?

To answer this question, we must keep in mind that what is valid for the parts must not, without change, be applied to the wholes. Biology has laws and notions of her own, dependent upon the determination in the basic physical and chemical realms, and just therefore introducing some aspects of indeterminism for the higher units. In extending will, with SCHOPENHAUER and NIETZSCHE, to the inorganic, we gradually arrive at something different, namely catalysis; in ascending from the laws found for catalysis, we find something that corresponds to them without identity. At the same time, progressing from the facts gained by experimentation to general notions, we lose the certainty and must content ourselves with fictions.

This seems to be MITTASCH's point of view and the essence of what he calls "biologic determinism." This philosophic chemist reminds us of a great philosophic poet, who wrote: "Unser ganzes Wissen läuft endlich, wie alle Weltweisen übereinkommen, auf eine konventionelle Täuschung hinaus, mit welcher jedoch die strengste Wahrheit bestehen kann." (5) Those who deem the doctrine of fiction unsatisfactory, will prefer another analogy. We have two ways of exploring the truth: experimentation and philosophical attempts of expression. They have

(5) FRIEDRICH SCHILLER, "Philosophische Briefe" (1787), in the ed. of the "Bibliogr. Institut" Leipzig, Vol. 15, p. 153.

developed with different velocity. In earlier times, the final result was expected from philosophical discussion; later on, experimentation alone was trusted to lead to the goal. There were—and may be, there still are—those who, like AUGUSTE COMTE, thought after a certain and definite amount of experimental work, its philosophic discussion was all there remained to be done, and they would deplore " la vaine extension des travaux actuels... au défaut de vues philosophiques." (6)

In our times, thinkers like MITTASCH realize that progress towards truth needs the parallel development of both of them. He who does not know sees parallels meet on his horizon; he who knows avoids this deceptive evidence. We must therefore expect the discussion to be endless. But it is not fruitless. Moving along these parallel rails, we do not reach paradisiacal conformity with the universe, but we discover new countries.

Heidelberg. EDUARD FÄRBER.

(6) See the strange little book by TEIXEIRA MENDES, " La philosophie chimique d'après AUGUSTE COMTE," Rio de Janeiro, 1887.

Notes and Correspondence

Query n°. 76.—*The tradition of the optics of* IBN AL-HAITHAM. — At the end of the thirteenth century and the beginning of the fourteenth, there was a remarkable blossoming out of optics, East and West. It will suffice to recall the names of the Englishmen ROGER BACON and JOHN PECKHAM, of the Pole WITELO, of the French JOHN OF PARIS (d. 1306), of the German DIETRICH OF FREIBERG, of the African (Mâlikî) SHIHÂB AL-DÎN AḤMAD BEN IDRÎS AL-QARÂFÎ AL-SANHÂJÎ (d. 1285) and of the Persians NÂṢIR AL-DÎN AL-ṬÛSÎ, QUṬB AL-DÎN AL-SHÎRÂZÎ and KAMÂL AL-DÎN AL-FÂRISÎ (1). The main source of these writings, Latin or Arabic, was the *Kitâb al-manâẓir* of IBN AL-HAITHAM (d. c. 1039). Now there is no difficulty in understanding the tradition of IBN AL-HAITHAM's optics to Persia, but when and how was it transmitted to the west?

As I was re-investigating the origin of DIETRICH's views, I was ashamed to discover that I had taken the tradition of the *Opticae thesaurus Alhazeni* too much for granted. My *Introduction* contains (vol. 2, 23) an error (or unproved statement) on the subject "The *Kitâb al-manâẓir* was translated into Latin by GERARD OF CREMONA". That error (or unproved statement) was inadvertently introduced in the general recapitulation; it does not occur in my chapter on GERARD OF CREMONA, where I simply stated that GERARD translated the *De crepusculis et nubium ascensionibus* (printed in Lisbon 1542, the first writing of IBN AL-HAITHAM to be printed). In the great edition prepared by FRIEDRICH RISNER (d. 1580), which extended the Alhazenian influence to the seventeenth century, the *De crepusculis* is reprinted (p. 283-88) with the mention "Gerardo Cremonensi interprete", but no translator is named with regard to the main work. When was the latter translated? and by whom? It is remarkable that the tradition of such a fundamental work should be so obscure.

As to the date we can only say that if the translation was not made in the time of GERARD OF CREMONA, or before, it cannot have been post-

(1) I may recall that a well illustrated edition of KAMÂL AL-DÎN's *Kitâb tanqîḥ al-manâẓir* has been recently published in Ḥaidarâbâd in the Deccan (2 vols. 1347-48 = 1929).

OPTICAE THESAVRVS.

ALHAZENI ARABIS

libri ſeptem, nunc primùm editi.

EIVSDEM liber DE CREPVSCVLIS & Nubium aſcenſionibus.

ITEM

VITELLONIS THVRINGOPOLONI

LIBRI X.

Omnes inſtaurati, figuris illuſtrati & aucti, adiectis etiam in Alhazenum commentarijs,

A

FEDERICO RISNERO.

Cum priuilegio Cæſareo & Regis Galliæ ad ſexennium.

BASILEAE,
PER EPISCOPIOS. M D LXXII.

poned very much longer, for JOHN PECKHAM and WITELO, both of whom were educated in the third quarter of the thirteenth century, were very well acquainted with it. In fact WITELO's Optics, composed between

VITELLONIS THV
RINGOPOLONI OPTI-
CAE LIBRI DECEM.

Inſtaurati, figuris nouis illuſtrati atque aucti: infinitisq; erroribus, quibus antea ſcatebant, expurgati.

A

FEDERICO RISNERO.

BASILEAE.

1270 and 1278 and dedicated to WILLIAM OF MOERBEKE, was largely derived from IBN AL-HAITHAM's.

There is no known Hebrew version but the original Arabic text was familiar to the oriental Jews, and one of them, JOSEPH IBN 'AQNÎN (d. 1226;

Intr. 2, 380) spoke of it as superior to the "books of EUCLID and King PTOLEMY" (M. STEINSCHNEIDER, *Hebraeische Übersetzungen*, 1893, 558).

We illustrate this query with two title pages of the great RISNER edition (Basel 1572), two folio volumes containing, the first (6+288 p.) the optics of IBN AL-HAITHAM, and the second (6+474 p.) the optics of WITELO. Each volume has its own pagination, but they were obviously meant to be bound together, as the title page of the second volume is a secondary title page, and there is but one colophon, placed at the end of the second volume, dated August 1572. Our two illustrations are taken from the Harvard Library copy with that library's gracious permission. The word Alhazeni in the first is 114 mm. long; the rectangle in the second measures 152 by 138 mm. The same woodcut, referring to a well known Archimedian legend, occurs on the back of the first title page with the inscription "Triplicis uisus, directi, reflexi et refracti, de quo optica disputat, argumenta."

GEORGE SARTON.

Query n° 77.—The beginning of European syphilis.—In his review of Dr. HOLCOMB's book " Who gave the world syphilis? (New York 1937; *Isis* 28, 101-02), Professor ASHLEY-MONTAGU is perhaps a little too confident " The tradition that syphilis in Europe had its origin in Haiti, and that it was imported with the return of COLUMBUS in 1493 from his first voyage, is the ' myth ' which Dr. HOLCOMB, after having carefully examined the evidence, is quietly determined to destroy. Where, in this connection, SUDHOFF was able to cast a doubt, HOLCOMB has completely succeeded in proving the case against the Haitian myth."

To my mind the matter is very far from proved. For if syphilis existed in Europe before 1493, how is it that not a single clinician —either Greek or Arab or Christian—ever described it? And yet some of the primary symptoms are clear enough. On the other hand the explosive development (1) of the disease after 1493 is just what one would expect if *Spirochaeta pallida* had been making then her European début. We have learned considerably within the last fifty years concerning the sudden introduction of an organism in a new territory. Think of the ravages made by the gypsy moth in Massachusetts in 1889 and later, or by the San José scale in the Eastern states in 1893, or the arrival of the cotton boll weevil in Texas in the following

(1) " Explosive " refers not only to the rapid transmission, but also to the fulminating development of the disease within each individual, a development very different from the present one, suggesting that Europeans were not yet prepared against it.

year (*Isis* 16, 170). Or to return to medicine, think of the decimation of native populations by the introduction of diseases to which white men had become gradually adapted and which had ceased to be dangerous for them, yet were often fatal for the new victims. It should be noted that syphilis is not contagious in the same dreadful way, as say, cholera or bubonic plague. It is not an epidemic disease. And yet at the end of the fifteenth century and in the sixteenth its dissemination was almost of an epidemic nature, witness the abundant literature devoted to the subject and the kind of panic which was induced. Surely if syphilis had been an ancient misery in the Old World its development (social and individual) would have been very different.

For other studies on the subject than HOLCOMB's, recently reviewed in *Isis*, see GASTON VORBERG : *Über den Ursprung der Syphilis* (Stuttgart 1924; *Isis* 7, 201). E. JEANSELME : *Histoire de la syphilis* (Paris 1931; *Isis* 19, 249-52). WILLIAM VAN WYCK : *The sinister shepherd*. A translation of FRACASTORO's *Syphilidis* (Los Angeles, 1934; *Isis* 23, 454). RENAUD and COLIN : *Documents marocains pour servir à l'histoire du " mal franc "* (Paris 1935; *Isis* 25, 269).

In a letter dated March 7, 1938, Prof. ASHLEY-MONTAGU points out that HOLCOMB's book and his own review refer exclusively to the Haitian myth. Yet the two controversies merge necessarily into one. For if *Spirochaeta pallida* did not exist in Europe before 1493, and did not come from the New World, where on earth did she come from?

GEORGE SARTON.

Question n° 78. — Il existe aujourd'hui, en différents pays, des Sociétés ayant pour but de commémorer, sous des formes diverses, la vie et l'œuvre de savants illustres : telle la *Société Purkyně* en Tchéco-Slovaquie. Mais ces Sociétés, bien que souvent susceptibles de rendre aux historiens des sciences les plus précieux services, sont peu connues parfois. Il apparaît donc désirable d'en établir une liste aussi complète que possible. A titre d'exemples des renseignements — sommaires mais précis — qu'il conviendrait de fournir sur ces Sociétés, nous donnons ici des indications relatives à trois d'entre elles constituées récemment en France, espérant que les lecteurs d'*Isis* auront à cœur d'adresser au Directeur de cette revue des renseignements qui, pour être d'une nature triviale, n'en seront pas moins singulièrement utiles, par la publicité qu'ils confèreront à des labeurs et à des publications dont le caractère n'est que trop fréquemment confidentiel.

1. *Société cartésienne de Châtellerault* (fondée en 1934).

Siège social : Maison René-Descartes, rue Bourbon, 126, Châtellerault (Vienne), France.

Cotisation : 5 fr. par an.

But : "La Société cartésienne de Châtellerault se propose d'étudier et de vulgariser tout ce qui touche à la vie et à l'œuvre de DESCARTES... Ses efforts se joindront à ceux de la ville... pour... enrichir la Maison RENÉ-DESCARTES... Elle publiera... des travaux concernant DESCARTES et sa famille châtelleraudaise..."

Publication : "*Le Glaneur Châtelleraudais*", revue trimestrielle, a publié un no. spécial (4e année, mai 1937) consacré à DESCARTES.

2. *Société des Amis d'André-Marie Ampère* (Société déclarée le 12 juin 1930 et reconnue d'utilité publique par décret du 4 avril 1936).

Siège social à Poleymieux (Rhône); siège administratif, 170, avenue Jean-Jaurès, Lyon.

Cotisation : 20 fr. par an.

But : "... perpétuer la mémoire d'ANDRÉ-MARIE AMPÈRE par tous moyens... convenables, notamment par conférences, publications, réunion de documents et d'appareils, création de musée, établissement de centre de recherches, fondation de bourses et de prix, etc..."

Publication : " *Bulletin de la Société des Amis d'André-Marie Ampère* "; No 1, juin 1931; —

3. *Société des Amis de Paul Painlevé* (fondée en 1934).

Secrétaire général : PIERRE APPEL, 3, rue du Vieux-Colombier, Paris, 6e.

Siège social : même adresse.

Cotisation : 10 fr. par an.

But : "... Veiller sur la mémoire de PAINLEVÉ et sur la survivance de ses idées... Maintenir, entre ceux qui ont été ses amis fidèles et se sont imprégnés de sa pensée, les liens d'une union solidaire..."

Publication : *Paul Painlevé : Paroles et écrits*, publiés par la Société des Amis de PAUL PAINLEVÉ (1 vol. XXIX+672 pp., Paris, RIEDER, 1936; 20 francs).

(Bruxelles) J. PELSENEER

Answer to Query 61. (*Isis* 25, 452-4)—JOHANNES SCULTETUS, *in the sixteenth century.*

The name, JOHANNES SCULTETUS, occurs before as well as after the time of the author of the *Armamentarium chirurgicum*, who lived from 1595 to 1645, and whose work first appeared posthumously in 1653 (1).

HELLMANN notes a JOHANNES SCULTETUS (SCHULTIS von Krakau)

(1) See *Isis*, 25 (1936), 452-54; 27 (1937), 63-66 : Query no. 61 and answers thereto.

who issued annual astrological predictions from 1501 to 1506 in Latin and German (2).

Later in the century a JOHANNES SCULTETUS MONTANUS copied the *Paragranum* of PARACELSUS. As SUDHOFF has pointed out, HUSER's edition of the work, which is the earliest text extant, was based in large part on that of SCULTETUS (3).

What the relationship of the JOHANNES SCULTETUS of 1595-1645 may have been to these two predecessors, or possible forebears, I do not know. But he should hardly be called "the elder" or "first SCULTETUS". Since there were two before him and two after him, he would seem rather to have been the Middler.

Columbia University,
New York, U. S. A.

LYNN THORNDIKE.

Answer to Query 75. (*Isis* 29, 99). RAFAELE CANACCI. — In risposta alla lettera da Lei indirizzatami e ricevuta ieri, posso subito dirle che il manoscritto del CANACCI è stato studiato anzitutto dal COSSALI, che ne dà notizia nella sua opera : *Origine, trasporto in Italia, primi progressi in essa della algebra*; a p. 7-9, 25 del 1° volume, e più volte lo ricorda anche nel seguito (p. 32, 180, 182, 188...) Il LIBRI pure ne parla nella *Histoire des sciences mathématiques en Italie*, oltre che alla p. 208, da Lei ricordata, anche a p. 45, 46 del 2° volume; dove, a proposito di GUGLIELMO DE LUNIS, cita il GHALIGAI. Nell' opera del GHALIGAI, non si parla menomamente del CANACCI, ma si riporta un lungo brano da GUGLIELMO DE LUNIS, richiamato anche dal LIBRI a p. 46. Questo brano è identico a quello che si legge nella riproduzione fotografica del manoscritto segnato c. 1460, pubblicata nella *Rara arithmetica*, a p. 463. Ciò mi fa credere che quel manoscritto sia veramente una copia del CANACCI, perchè, non solo il passo pubblicato dal GHALIGAI (identico a quello del C. 1460) risponde a qanto avevano osservato il LIBRI ed il COSSALI, sul CANACCI; ma, dopo tale passo, il manoscritto della *Rara arithmetica* continua con un richiamo a LEONARDO PISANO, che corrisponde a quanto il COSSALI dice a p. 8 : (... il CANACCI ricorre in seguito anche al libro di LEONARDO, e della autorità di lui si vale...).

Il manoscritto segnato c. 1460 è stato minutamente studiato dal KARPINSKI nella memoria : "An Italian algebra of the fifteenth century"

(2) G. HELLMAN, Versuch einer Geschichte der Wettervorhersage im XVI, Jahrhundert, *Abhandlungen der preussischen Akademie der Wissenschaften.* Jahrgang 1925, Physikalisch-Mathematische Klasse, Berlin, 1924, Nr. 1, p. 29.

(3) KARL SUDHOFF, *Versuch einer Kritik der Echtheit der Paracelsischen Schriften*, 1894, I, viii; PARACELSUS, *Sämtliche Werke*, I, VIII, 1924, p. 6.

pubblicato nella *Bibliotheca mathematica* di ENESTRÖM (vol. XI, 209-19, 1911). In quella memoria il KARPINSKI riproduce larghi passi di quel manoscritto, e ciò potrà giovare al confronto col manoscritto di CANACCI che si trova a Firenze. Se Ella lo desidera potrò recarmi colà, (Firenze è assai vicina a Bologna, ed un mio figliolo: ENEA, è professore alla Università di Firenze), e fare il debito confronto.

Posso intanto fare una osservazione riguardo a quei 7 nomi che nel manoscritto di GUGLIELMO DE LUNIS si danno per le operazioni che intervengono nella applicazione della Regola d'algebra. Quei nomi sono: Geber, Elmechel, Elchal, Elchelif, Elfazial, Di-fareburam, Eltermen. Si trovano anche riportati dal GHALIGAI, e dal LIBRI, e, naturalmente anche dal KARPINSKI, ed il GUGLIELMO DE LUNIS traduce per: recuperazione, esempio, ovvero assimilazione, opposizione, disposizione (...se non habbino disposizione a uso delle regole, el caso sarebbe fuori delle regole...), differenza, fare ragione, finizione. Credo, dicevo, che quelle parole, malamente tradotte dal GUGLIELMO DE LUNIS, forse corrispondono alle parti che nella tecnica delle proposizioni di tipo classico erano considerate, e dette: (salvo l'ordine) Prótesi, éctesi, diorismà, apagoge, costruzione, dimostrazione, conclusione; che si riscontrano anche in DIOFANTO, come feci vedere nella mia memoria su l'algebra nella storia e nella preistoria, pubblicata in *Osiris* (vol. 1, p. 194, 195, 1936).

Mi sovviene, a questo proposito, che il LORIA credette di aver trovato il manoscritto di GUGLIELMO DE LUNIS; ne scrisse al CANTOR annunciando la scoperta, e mandò ad ENESTRÖM una riproduzione fotografica del manoscritto. Ma l'ENESTRÖM a prima vista subito si accorse che quello era il testo dell' ALKOVARISMI, pubblicato dal LIBRI. Del resto in margine e di fianco allo scritto, su lo stesso manoscritto si leggeva: "Incipit liber Gebri de numero ..." (*Bibliotheca mathematica*, vol. IX, 73, 1908).

(*Bologna*, 17 *Febbraio* 1938) ETTORE BORTOLOTTI.

The Editor of Isis is always glad to publish notes relative to the teaching of the History of Science, the activities of societies devoted to our studies, or commemorations, provided that these notes be sufficiently brief and carefully written and do no require too much editing.

Easter 1938.

Comité belge d'histoire des sciences.—A la suite des élections de mars 1938, le bureau du Comité belge est organisé comme suit:

Président, JOSEPH BIDEZ; vice président, AUG. LAMEERE; membres, PAUL VER EECKE, chanoine A. ROME; secrétaire, JEAN PELSENEER, 51 avenue du Longchamps, Uccle, Bruxelles.

Le Comité a élu les cinq premiers membres associés : Madame PAUL TANNERY, Madame PAUL METZGER-BRUHL, toutes deux de Paris, GINO LORIA de Gênes, OTTO NEUGEBAUER de Copenhague, et GEORGE SARTON de Cambridge en Nouvelle Angleterre.

Baltimore.—Under Dr. SIGERIST's direction the William H. Welch Medical Library is becoming more and more the main center not only of medical history but of medical humanism in this country. A " graduate week in medical history " was recently organized (April 18-23, 1938) at the Institute of the history of medicine which he is directing. On April 18 a festal evening was devoted to the fascinating subject, " Music in medicine."

After Dr. SIGERIST's introductory lecture, there was a concert the program of which deserves to be quoted :

1. Frottola by MARCHETTO CARA, on the Syphilis of Marchese FRANCESCO GONZAGA of Mantua (1517);
2. Music played in the treatment of Tarantism, as transmitted by ATHANASIUS KIRCHER, *De arte magnetica*, 1641;
3. Vita et gesta sancti SEBASTIANI, singularis contra pestem patroni (1702).

According to the accounts published in newspapers (e.g., in the *Baltimore Sun* and the *New York World*) the concert and meeting were very successful.

University of Cambridge (1937-38).—The following lectures, given in the lecture room of the physiological laboratory, were open without fee to all members of the University or of Girton or Newnham College :

1.	October	14	Dr. CHARLES SINGER : The value of the history of science.
2.	»	20	Prof. CORNFORD : Greek philosophy and science.
3.	November	2	Sir THOMAS HEATH : Greek astronomy and mathematics.
4.	»	12	Dr. W. H. S. JONES : Greek biology, physiology and medicine.
5.	»	19	Prof. JOHN READ : Early alchemy.
6.	»	26	Dr. E. J. HOLMYARD : The science of Islam.
7.	December	3	Mr. M. POSTAN : The relation of science to industry before 1500.
8.	January	21	Prof. F. SAXL : Science and the arts of the Renaissance.

9.	»	28	Dr. AGNES ARBER: Botany in the sixteenth and seventeenth centuries.
10.	February	4	Dr. W. PAGEL: PARACELSUS to MALPIGHI; animal biology in the sixteenth and seventeenth centuries.
11.	»	11	Prof. E. N. DA C. ANDRADE: DESCARTES and NEWTON; mechanics and physics in the sixteenth and seventeenth centuries.
12.	»	18	Miss MARGARET MCDONALD: Science and the philosophy of matter in the eighteenth century; LOCKE, CONDILLAC, LA METTRIE and the Encyclopaedia.
13.	March	4	Dr. JOS. NEEDHAM: Social and economic background of sixteenth and seventeenth century science.
14.	»	11	Mr. H. T. PLEDGE: The relation of science to industry after 1500.

Les Sociétés Scientifiques Roumaines.—La plus ancienne société scientifique en Roumanie est celle de Iaşi : *Societatea Medicilor şi Naturaliştilor din Iaşs*, fondée en 1830, grâce au Docteur CZIHAC. Cette société a contribué à créer une belle atmosphère scientifique à Iaşi, où l'on a publié de 1883 à 1889 la première revue roumaine de sciences exactes *Recreaţiuni ştiinţifice*. C'est également cette société qui préside à la publication de la revue actuelle *Annales Scientifiques de l'Université de Jassy*. (Tome XXII, paru en 1936).

Le premier essai pour la création d'une société des sciences à Bucarest, fut fait en 1862 par E. BACALOGLU. Mais les statuts de la Société étaient trop sévères : les membres qui ne présentaient aucune communication durant trois mois, étaient exclus de la Société. Aussi, celle-ci n'eut qu'une durée éphémère. Un nouvel essai, en 1868 n'eut pas plus de succès.

En 1876 on créa *Societatea Inginerilor si Arhistecţilor*, qui fit la place en 1881, à la *Societatea Politecnică din Românie*. Cette société comprend les ingénieurs, aussi bien que les savants purs : mathématiciens, physiciens, chimistes. Elle compte aujourd'hui plus de 1100 membres et publie un *Bulletin* mensuel, qui forme un volume de plus de 1000 pages par an. Le volume du cinquantenaire de la Société eut environ 2000 pages.

Le 24-III-1890 le Dr. C. I. ISTRATI réussit à créer à Bucarest *Societatea de Stiinţe Fizico-Chimice*, suivie le 29-V-1894 par *Amicii Stiintelor Matematice*, qui est due à l'activité du prof. C. GOGU. Ces deux sociétés fusionèrent le 13-I-1897 dans la grande *Societatea Română*

de Stiinţe, qui existe encore aujourd'hui, ayant environ 400 membres. Elle est divisée en quatre *sections autonomes*, qui publient chacune son *Bulletin* : *a*) mathématiques (*Societatea Română de Matematici*), *b*) physique, *c*) chimie, *d*) sciences biologiques. Chaque section a deux séances par mois. La société tout entière se *réunit* assez rarement et surtout pour des questions administratives ou bien pour de conférences générales. Elle publie un *Bulletin al Sedintelor*, contenant des renseignements administratifs et les procès-verbaux des séances des sections. En réalité, c'est *Societatea Română de Stiinţe*, qui a organisé tous les neuf congrès dits de l'*Association Roumaine pour l'Avancement des Sciences*. Les premiers huit sont l'œuvre de l'infatiguable animateur Dr. C. ISTRATI : Iaşi 1902 ; Bucarest 1903, dont les comptes rendus forment un volume de 1562 pag. in-4° ; Craiova 1904 ; Constanta 1905 ; Bucarest 1906 ; Focşani 1909 ; Târgovişte 1911 ; Galati 1912. Après la guerre, il y eut un seul de ces congrès : Bucarest 1934, présidé par L. MRAZEC et dont l'organisateur fut O. ONICESCU.

En dehors de cette Grande Société des Sciences de Bucarest, il y a encore deux sociétés dissidentes : *Societatea Naturaliştilos dus Romania* et *Societatae chimiştilos dus Romania*. Les ingénieurs ont en plus une société particulièrement destinée à leurs intérêts professionnels A. G. I. R. (*Asociatia generală a inginerilor români*). Enfin, comme suite du second congrès des mathématiciens roumains (1932), on a fondé en 1933, sous la présidence de V. VÂLCOVICI : *Asociaţia profesorilor de matematici*, dont les buts sont purement didactiques et professionnels.

A Cluj on créa en 1920, sous la présidence de E. RACOVITĂ, *Societatea de Stiinţe din Cluj*, qui publie un *Bulletin* (8 tomes parus, d'environ 640 pag. chaque). Cette société a un *Cercle botanique* et un *Cercle mathématique*, qui organisent des séances mensuelles.

Enfin, il y a une *Société Scientifique*, créée, il y a quelques années, près de l'Ecole Polytechnique de Timişoara.

L'*Académie Roumaine* correspond en réalité à l'*Institut* en France. Créée en 1866, elle comprend trois sections à 15 membres actifs et 25 correspondants : 1° section littéraire (avec la philosophie et les beaux arts) ; 2° section historique (avec les sciences juridiques) ; 3° section scientifique. L'Académie publie : *a*) Les *Annales* (comptes rendus des séances, actes administratifs) ; *b*) Les *Mémoires* de chaque section (trois volumes par an, en Roumain) ; *c*) Les *Bulletins* (des sections historique et scientifique ; deux volumes par an, en français).

La liste précédente ne contient pas les Sociétés Médicales, les sociétés pour l'expansion de la science, l'Athénée Roumain, etc.

Il faudrait, peut-être, ajouter la société *Gazeta Matematica* (127 membres). Fondée 1895 par dix ingénieurs et professeurs, qui s'engageaient

de soutenir de leur argent la publication régulière d'une revue mathématique pour les étudiants, la rédaction se transforma en société vers 1908, avec le même but. La revue *Gazeta Matematică*, dont le tome 41 s'achève avec environ 600 pages, a largement contribué à la création de l'école mathématique contemporaine en Roumanie.

Cluj P. SERGESCU.

Science and Society. At its Indianapolis meeting (end of 1937) the A.A.A.S. voted unanimously the following resolutions :

"*Whereas*, science and its applications are not only transforming the physical and mental environment of men, but are adding greatly to the complexities of the social, economic and political relations among them; and

"*Whereas*, science is wholly independent of national boundaries and races and creeds and can flourish permanently only where there is peace and intellectual freedom : now

"*Therefore*, Be it resolved by the council on this thirtieth day of December 1937, that the *American Association for the Advancement of Science* makes as one of its objectives an examination of the profound effects of science upon society; and that the *Association* extends to its prototype, the *British Association for the Advancement of Science*, and to all other scientific organizations with similar aims throughout the world, an invitation to co-operate, not only in advancing the interests of science, but also in promoting peace among nations and intellectual freedom in order that science may continue to advance and spread more abundantly its benefits to all mankind."

The A.A.A.S. and B.A.A.S. are of one mind on these fundamental questions and their officers are now exploring means of combining their forces to the best advantage of science and mankind.

Hermann Boerhaave (1668-1738).—On Friday, September 23rd, 1938, two hundred years will have gone by since HERMAN BOERHAAVE died at Leyden, leaving to the coming generations, for their instruction and criticism, his whole life and work.

The " Nederlandsche Maatschappij tot bevordering der Geneeskunst," with the concurrence of the " Faculteit voor geneeskunde der Rijks-Universiteit te Leiden", " Het Nederlandsch tijdschrift voor Geneeskunde te Amsterdam " and of the " Genootschap voor geschiedenis der Genees-, Natuur- en Wiskunde," resolved solemnly to commemorate that day.

Various physicians of this and foreign countries will, on that day, at a meeting of the Academical Senate and of many invited persons,

speak about the importance of BOERHAAVE; moreover a commemorative Memorial will be issued in which, besides the lectures of those physicians, contributions from the hand of some foreign physicians, botanists and chemists will be inserted.

When this ceremony is over, a wreath will be deposited at the statue of BOERHAAVE, whereupon will be visited the Church where he lies burried, the old wards of the former St. Caecilia hospital where BOERHAAVE taught clinics, and his country seat "Poelgeest" near Leyden.

On the following day, Saturday September 24th, a collective excursion will be made to the vicarage at Voorhout, a little village near Leyden where BOERHAAVE was born; from there the party will proceed to Harderwyk, the old little town near the Zuyderzee, where formerly a University was situated where BOERHAAVE gratuated in medicine on July 15th, 1693. On the occasion of this visit a memorial tablet will be placed.

Thus the Netherlands hope to give expression to her unchanged gratitude towards her great son and also solicits in foreign countries an interest for this historical celebration.

The Committee of Preparation :

Amsterdam, Holland,
Keizersgracht, 327.

April 4th, 1938.

Prof. Dr. J. A. J. BARGE, Leiden,
Prof. Dr. E. COHEN, Utrecht,
Dr. C. H. A. T. FEHMERS, Rotterdam,
Prof. Dr. P. H. G. VAN GILSE, Leiden,
Prof. Dr. P. C. FLU, Leiden,
Dr. F. W. T. HUNGER, Leiden,
Dr. L. C. KERSBERGEN, Haarlem,
Dr. B. W. TH. NUYENS, Amsterdam,
Prof. Dr. G. A. VAN RYNBERK, Amsterdam,
Dr. D. SCHOUTE, WASSENAAR.

The American Association of the History of Medicine devoted its 14th annual meeting (Hotel Chalfonte, Atlantic City, N. J. Monday, May 2, 1938) to the commemoration of HERMANN BOERHAAVE.

Heinrich Hertz (1857-94).—The following item cut out from the *New York Times* of March 26 (wireless dated Vatican City, March 25) is an interesting footnote to the history of physics. In spite of his premature death at 37, HERTZ is one of the greatest physicists of the nineteenth century, one who deserves a deeper and purer fame than MARCONI who reaped the abundant fruits of his discovery.

"Pope PIUS has sent what the Vatican describes as a 'generous money grant' to the family of the famous German scientist, HEINRICH

RUDOLF HERTZ, whose discoveries were the forerunner of wireless and whose widow and two daughters fled from Germany some time ago to England and now live there in dire want.

"Herr HERTZ was a Jew, though from Aryan stock. His widow and two daughters are Protestants. They lived for some time at Bonn on a modest pension until Nazi molestations drove them to Britain, where they are without resources.

"The Pope's gesture was much commented on in Rome, where it was unanimously interpreted as a slap to Germany. The head of a Christian religion, it is pointed out, has shown himself to be more charitable toward a Frotestant family of a Jew than the government of the country to which it belongs, and in so doing again underlined his profound aversion to the racial and religious theories of the Nazis."

Reviews

Krause, Max.—*Die Sphaerik von Menelaos aus Alexandrien in der Verbesserung von Abū Naṣr Manṣūr b.ʿAlī b.ʿIrāq.* Mit Untersuchungen zur Geschichte des Textes bei den islamischen Mathematikern. VII + 255 p. + 110 p. in Arabic + 7 tables with figures. (Abhandlungen der Gesellschaft der Wissenschaften zu Göttingen, philologisch-historische Kl. Nr. 17). Berlin, WEIDMANN, 1936.

MENELAUS OF ALEXANDRIA (c. 100) was the first to disentangle trigonometry from astronomy and stereometry, and in his *Sphaerica*, for the first time, the conception and definition of a spherical triangle is given. Few texts had a more chequered history than that of the *Sphaerica*. Its vicissitudes are characteristic for the difficulties and problems with which the history of the transmission of Greek science is frequently confronted.

The Greek original is lost. There were some Syriac translations, which, however, got lost, too. In the second half of the ninth century, several Arabic versions were circulating, but we know not whether they were prepared from the Greek original or from the Syriac translation. Yet we do know that they must have been based upon some poor, imperfect and obscure, manuscripts; because almost all of them claim to be improved revisions, interpretations, or elaborations of the original text. Prior to the present edition by KRAUSE of ABŪ NAṢR's version, none of them has been published. Around 1273 a Hebrew translation was prepared by JACOB B. MACHIR, and it has long been doubtful whether it derived from an Arabic version or from the Latin rendering of GERHARD OF CREMONA. However, the researches of A. A. BJOERNBO (1874-1911) in the *Abhandlungen zur Geschichte der mathematischen Wissenschaften*, Leipzig 1902, and of KRAUSE have established that it is to be traced to an Arabic source. The Hebrew text, too, has not yet been published; but, among others, two manuscript copies are extant in the Bodleian and two are in the possession of the Library of the Jewish Theological Seminary of America, New York City. The latter are the manuscripts of which J. GINSBURG has published the first proposition in two pages in the *Scripta Mathematica* I, 1932, pp. 72-78.

There are also three Latin translations. (1) By GERHARD OF CREMONA (1114-87), extant in manuscript only. (2) By MAUROLYCUS, printed at Messina 1558, and based upon an Arabic text. (3) By EDMUND HALLEY

MENELAI

SPHÆRICORUM

LIBRI III.

Quos olim, collatis MSS. *Hebræis* & *Arabicis*, Typis exprimendos curavit Vir Cl. Ed. HALLEIUS L. L. D. R. S. S. & Geometriæ Profeſſor Savil. *Oxonienſis*.

Præfationem addidit
G. COSTARD, A. M.

OXONII,
SUMPTIBUS ACADEMICIS,
M DCC LVIII.

(1656-1742), published at Oxford 1758, and based upon the Hebrew translation of JACOB B. MACHIR. The Maurolycus-edition was a very poor one, full of unfounded restorations and plain interpolations. HALLEY's translation was the only reliable one available in print. Thus

the *Spherics* written by the Greek astronomer MENELAUS in about 100 A.D., was until now accessible in a Latin translation made by the English astronomer HALLEY from a Hebrew rendering of an Arabic

[1]

BENEVOLO LECTORI.

EUCLIDEM, qui Mathematicorum Agmen ducit, à Viro Doctiſſimo Davide Gregorio, Aſtronomiæ Profeſſore Saviliano longe Celeberrimo A.D. 1703. editum, ſequebantur Apollonii Pergæi Libri de *Sectione Rationis & Spatii*; quos conclamatos habitos, tandem ex Arabico MS. Latine verterat, ac reſtituerat A.D. 1706, Vir omni Laude major Edm. Halleius, Gregorii Collega conjunctiſſimus. * Anno proxime ſequenti, Auctorem hunc exceperunt Theodoſii Sphærica, quorum Editionem curavit Joſ. Hunt, Collegii Balliolenſis Magiſter Digniſſimus.

Preli Oxonienſis exornandi Studio, ad hunc modum excitato, A.D. 1710 ſequebatur Apollonius Pergæus, cum Pappi Alexandrini Lemmatibus, & Eutocii Aſcalonitæ Commentariis locupletatus. His accedebat Serenus Antiſſenſis de Sectione Cylindri & Coni. Horum Editionem curavit Vir ſummus, ſupra memoratus, Edm. Halleius.

Quo Conſilio, & quibus hortantibus, Opus illud nobile ſuſcepit, ipſe ſatis inter præfandum aperuit. Ejuſdem Studiis & Vigiliis *Menelaum* hunc noſtrum debet Reſpublica Mathematica, quem, (licet eo ipſo curante Typis Academicis *integrum* expreſſum) in Lucem nondum prodiiſ-

* A.D. 1707.

ſe

version, possibly made from a Syriac translation of a defective Greek original.

The present edition by M. KRAUSE brings us a few steps nearer to the Greek original. We are now having before us the edition of ABŪ NAṢR MANṢŪR (c. 1007/8), the teacher of the famous AL-BĪRŪNĪ, in the

Arabic text and with a German translation. In the first part of the book, pp. 1-98, KRAUSE presents a thorough critical investigation of the history of the text. He arrives at the following conclusions: 1. Already at the beginning of the 9th century (c. 815) there was an Arabic version

MENELAI
ALEXANDRINI
SPHÆRICORUM
Lib. I.

DEFINITIONES.

I. *Triangulum Sphæricum* eſt ſpatium comprehenſum ſub arcubus circulorum magnorum in ſuperficie Sphæræ.

II. Atque hi arcus, qui ſemper minores ſunt ſemicirculo, dicuntur *latera* vel *crura* Trianguli.

III. *Anguli* autem eorum ſunt anguli quos continent circuli magni in ſuperficie Sphæræ.

IV. Et hi *Anguli æquales* dicuntur, quando inclinantur ad invicem plana arcuum eoſdem continentium æquali inclinatione.

V. Et ſi duorum arcuum plana inclinentur ad invicem majori inclinatione quam duorum aliorum arcuum plana inter ſe, erit angulus ab iiſdem arcubus contentus etiam major.

VI. Et ſi plana arcuum contineant angulum rectum, ipſi arcus etiam dicuntur continere angulum rectum.

of the *Spherics*, prepared by a poor translator from an imperfect original. KRAUSE's conjecture is that this translation was made by AL-ḤAJJĀJ B. YŪSUPH, but there is no documentary evidence whatsoever for his hypothesis. 2. An improved revision of it was made by AL-MĀHĀNĪ (c. 864), and about one hundred years later this edition was further

improved by AL-HARAWĪ. 3. Another much better Arabic version, quite independent of the old ḤAJJĀJ-translation and based upon a more perfect manuscript, was prepared by ISḤĀQ B.ḤUNAIN. 4. An anonymous Arabic author used the edition of AL-MĀHĀNĪ and that of ISḤĀQ B.ḤUNAIN for a compilation of a new version of the *Spherics*. This version served as the basis for the Latin translation of GERHARD OF CREMONA, as well as for the Hebrew translation of JACOB B.MACHIR. 5. The commented version of ABŪ NAṢR MANṢŪR, now edited by KRAUSE, preserves the translation of ISḤĀQ B.ḤUNAIN.

Most of the critical work in the investigation of the history of the text has been done by A. A. BJOERNBO and has been clearly presented by SARTON in his *Introduction to the History of Science*, 1,253-4. The old theory is that the oldest version goes back to ISḤĀQ B.ḤUNAIN. KRAUSE's new contribution is the hypothesis of a still earlier translation made by AL-ḤAJJĀJ.

In this connection I would like to call attention to a bibliographical curiosum with regard to HALLEY's edition of the *Sphaerica*. HALLEY lived 1656-1742, and all the authors and catalogs consulted by me refer to a posthumous edition prepared by GEORGE COSTARD, Oxford 1758, and containing a Preface by the latter, but at the same time several of them complain about the fact that the Preface was missing in their copies. Thus STEINSCHNEIDER and KRAUSE deplore the fact that they were unable to consult the Preface in the copy of the Berlin Library, and the Catalog of the British Museum lists two copies with the remark that in both of them the title page and Preface is wanting. BJOERNBO did see the Preface in the copy of the Copenhagen Library. Here, in New York City, I was fortunately in the position of using two copies, one with title page and Preface in the New York Public Library of 42nd Street, and one without title page and Preface in the Columbia University Library. The latter has 112 pages, while the former has title page and Preface, separately paginated in Roman letters I-VIII, affixed to the original text, which is otherwise identical.

Now, on the title page, COSTARD expressly states that HALLEY had made the translation and had also done the printing (*Typis exprimendos curavit*). Hence there were apparently two editions. The one was, as it seems, privately printed by HALLEY himself, without title page and Preface, and most probably privately distributed by him among his friends. In this form, without the title page and Preface, the book subsequently found its way into several libraries. In 1758, COSTARD printed the eight pages, containing the title and Preface, affixed them to the still remaining original copies and thus effected the public edition of the book.

This is also confirmed by the anonymous biographical Memoir, printed in the *Correspondence and Papers of Halley*, ed. MACPIKE, Oxford 1932, which reads on p. 11: "He (HALLEY) also prepared about the same time (1706-10) an Edition of MENELAUS' *Spherics*, which being printed off, still lies ready, but has not yet been given to the Publick." The Memoir has been written before HALLEY's manuscript observations were out of the hands of his executors. It is generally ascribed to MARTIN FOLKES, who lived 1690-1754. Its author, therefore, does not yet know of the *publication* of the book by COSTARD in 1758, but he gives us information about the private printing prepared by HALLEY himself in the time of about 1706-10.

New York City. SOLOMON GANDZ.

Editorial note.—I have examined the Harvard Library copy of HALLEY's edition of MENELAOS' spherics; it contains the preface wherein the matter is explained as GANDZ explained it above. HALLEY had the text printed somewhat in the manner of a modern editor who would have it clearly typewritten (and perhaps mimeographed) to facilitate further study of it. His intention of writing an introduction remained unfulfilled. That preface was finally written after his death by GEORGE COSTARD in or before 1758 and fills 8 pages plus 2 pages for the title; these 10 pages added to the 112 pages printed for HALLEY complete the book of 1758. The paper of the ten new pages is not quite the same as the paper of the text. COSTARD's preface describes the Arabic-Hebrew-Latin tradition of the Spherics, and gives whatever information was available to him concerning MENELAOS. Very little was (and is) known about MENELAOS, the main fact being that he made astronomical observations in Rome 97 A.D.

The Oxford orientalist GEORGE COSTARD (1710-82) was one of the early historians of astronomy. His activity as a pioneer in that field of learning would deserve a more thorough investigation than the one made by Miss AGNES MARY CLERKE (1842-1907) for the DNB (12, 274-75, 1887). He died at Twickenham 1782 in dire poverty.

There are other examples of books being printed without being published, two of which have already been referred to in this journal. The Arabic text of PAPPOS' commentary on the tenth book of EUCLID was edited by FRANZ WOEPCKE and printed in Paris 1855 but hardly published (*Isis* 16, 133). The Greek New Testament edited by Cardinal XIMENES was printed in 1514 but remained unpublished until 1522; it was the first printing of the Greek text but the second publication of it, being forestalled by ERASMUS, Basel 1516 (*Isis* 27, 423).

Thanks to the kindness of the Harvard Library I am able to publish

here reduced facsimiles of the title page of MENELAOS' *Spherics*, 1758, of the first page of COSTARD's preface, and of the first page of the text printed for HALLEY, hence before 1743 and perhaps as early as 1706-10. The word *sphaericorum*, second line of the title page, measures 85 mm. in the original; the word MENELAI, first line of p. 1 of text, measures 94 mm. in the original. G. S.

The tradition of Proclos' metaphysics.—PROCLUS. *The Elements of Theology.* — A revised text with translation, introduction and commentary, by ERIC ROBINSON DODDS. xlvii+340 p. Oxford, Clarendon Press, 1933.

The Elements of theology was first printed by FRANCESCO PATRIZZI, in Latin (Ferrara 1583); the Greek text was first edited by AEMILIUS PORTUS (Hamburg 1618); the second Greek edition by FRIEDRICH CREUZER (Francfort 1822) was hardly better than the first and sometimes worse. It was reprinted in the Didot PLOTINOS in 1855. The present work is thus the first critical edition of the Greek text, and in addition we are given an English version, an elaborate commentary (p. 187-321) and an *index verborum*. In short, thanks to the Professor of Greek in the University of Birmingham we have now for the first time a satisfactory presentation of one of the most important works of the final period of ancient philosophy. It is not entirely my fault if my review of it appears so late, for the author and the publisher had not enough imagination between them to send me a copy. I share their guilt to some extent because in my note on PROCLOS (*Intr.* 1, 402-04), I had overlooked the Elements of theology, except for a reference to it apropos of the *Liber de causis*. This was due to the fact that PROCLOS is of such fundamental importance for the study of mathematical and astronomical traditions that I had paid but little attention to his metaphysics; and also that the value of the Elements of theology depends largely on its repercussion on mediaeval thought rather than on its intrinsic merits. We shall come back to this presently, but it is better to begin by introducing the work to our readers.

"PROCLOS the Successor" (410-85) composed commentaries on HESIOD, PLATO, ARISTOTLE, EUCLID, HIPPARCH and PTOLEMY; he wrote the Platonic theology; books on religious symbolism and philosophical and theological subjects; finally two complementary textbooks, the Elements of physics (*Istitutio physica, sive de motu*) and the Elements of theology. The Elements of physics is a commentary on the Aristotelian theory of motion; the Elements of theology, a statement of Neoplatonic doctrine derived from PLOTINOS, PORPHYRY and IAMBLICHOS.

Historians of science might overlook that book because of its title,

Elements of theology, which is confusing. In fact the word "theology" in the title has not the modern meaning; it is taken in its Aristotelian sense of "prime philosophy". The Elements of theology is a textbook of metaphysics, "the one genuinely systematic exposition of Neoplatonic metaphysics which has come down to us". The style is Euclidean; the author tried to accomplish his purpose in the same way that SPINOZA tried to accomplish his own twelve centuries later. However his work, unlike SPINOZA's, was not an original creation but simply a summary of the doctrines which had been developing for centuries under a double pressure. First the increasing need of synthesis of the Greek philosophical traditions, second, the need of a new religious synthesis, a need which had been considerably excited by the mystery religions and by the theosophies and gnosticisms of oriental origin. One of the first to attempt such a synthesis was POSIDONIOS (I-1 B.C.) but he was too much of a Stoic to be able to satisfy the new oriental aspirations; the second great attempt was that of PLOTINOS (III-2), which opened up a new period. PROCLOS' Elements marks the rather dry climax of that period, the final petrifaction of two centuries of Neoplatonic adventure and poetry. Its contents are analyzed by the editor as follows (p. x) :

"The book falls into two main sections. The first of these (props. 1 to 112) introduces successively the general metaphysical antitheses with which Neoplatonism operated — unity and plurality, cause and consequent, the unmoved, the self-moved and the passively mobile, transcendence and immanence, declension and continuity, procession and reversion, *causa sui* and *causatum*, eternity and time, substance and reflection, whole and part, active and passive potency, limit and infinitude, being, life, and cognition. The remaining part (props. 113 to 211) expounds in the light of these antitheses the relations obtaining within each of the three great orders of spiritual substance, gods or henads, intelligences, and souls; and the relations connecting each of these orders with the lower grades of reality. The emphasis throughout is on structure; and for this reason, abstract and dessicated as the treatise appears on a first acquaintance, it has for the student of Neoplatonism the same sort of value relatively to the Enneads which the study of anatomy has for the zoologist relatively to the examination of the living and breathing animal."

Opinions concerning PROCLOS' originality vary greatly. The late BURY called him "the HEGEL of Neoplatonism". Let us give Professor DODDS' conclusion (p. xxv) :

"PROCLUS is not a creative thinker even in the degree of IAMBLICHUS, but a systematizer who carried to its utmost limits the ideal of the one comprehensive philosophy that should embrace all the garnered wisdom of the ancient world... Its fundamental weakness seems to me to lie in the assumption that the structure of the cosmos exactly reproduces the structure of Greek logic. All rationalist systems are to some extent exposed to criticism on these lines; but in PROCLUS

ontology becomes so manifestly the projected shadow of logic as to present what is almost a *reductio ad absurdum* of rationalism. In form a metaphysic of Being, the Elements embodies what is in substance a doctrine of categories : the cause is but a reflection of the "because", and the Aristotelian apparatus of genus, species and differentia is transformed into an objectively conceived hierarchy of entities or forces.

"Yet as the extreme statement of that rationalism which dominated European thought longer and to deeper effect than any other method, the Elements remains a work of very considerable philosophical interest. And its author was certainly something more than the superstitious pedant pictured for us by certain writers. Superstitious he unquestionably was, and pedantic also : in the fifth century after Christ it could hardly be otherwise."

Irrespective of its merit, the Elements of theology is extremely important because of its long and deep repercussion upon Western thought almost until the time of DESCARTES, and upon Eastern thought until the eighteenth century. My own experience is characteristic; after having neglected that work when I was dealing with PROCLOS himself, I was driven back to its study by abundant references to it in mediaeval writings, particularly in those of the German Dominican DIETRICH OF FREIBERG (d. c. 1311).

The history of the tradition of that work is so curious and so complex that it is worth while to retrace it. This will enable me to give the reader a remarkable example of mediaeval philosophical traditions, involving, as is usually the case, Western and Eastern threads, strangely entwined.

The account, if it were told completely would involve four main stories, each of them introducing its own derivations and complexities, to wit, the story of Proclian traditions in general, the story of the transmission of the Elements proper, finally the stories of two books derived from the elements, the one, Greek-Christian, the work of "DIONYSIOS THE AREOPAGITE", the other, Arabic, the *Liber de causis*.

It will be simpler to begin with these two complementary traditions, which constituted the main stream, if not the only one, until the middle of the eleventh century.

I. DIONYSIOS. — The mysterious "DIONYSIOS THE AREOPAGITE" produced very soon after PROCLOS' death, a Christian adaptation of the Elements, which was immensely popular and influential. It often runs so close to the original that it might be called a plagiarism. This has been proved by HUGO KOCH : *Pseudo-Dionysius Areopagita in seinen Beziehungen zum Neuplatonismus und Mysterienwesen* (Mainz 1900). The Dionysian stream was increased by the elaborate commentary of MAXIMOS CONFESSOR (VII-1), by the "Fountain of knowledge" of JOHN OF DAMASCUS (VIII-1), by the Latin translation and commentary of ERIGENA (IX-2), by the commentary of HUGH OF SAINT VICTOR (XII-1).

In 1148-50 BURGUNDIO OF PISA translated the main part of the Fountain of knowledge, *De orthodoxa fide*, and in the following century ROBERT GROSSETESTE (XIII-1) composed a new commentary. It is hardly an exaggeration to say that no Christian schoolman, whether Latin or Greek, escaped the Dionysian teaching. There are clear and abundant traces of it in the encyclopedic treatises of ALBERT THE GREAT and ST. THOMAS AQUINAS.

II. *Liber de causis.* — At some unknown date the Elements was translated into Syriac (?) and into Arabic. No MSS of those translations have as yet been identified, but we have an Arabic text derived from it, composed by a Muslim probably in the ninth century (before AL-FÂRÂBÎ's time, X-1). That text was edited by O. BARDENHEWER in 1882 (*Introd.*, 1, 405). It constituted the main stream of the Proclian tradition in the Arabic world and exerted its influence upon most of the Muslim and Jewish philosophers. For the Jews who could not read Arabic, no less than four Hebrew versions were eventually made (1); and there is also an Armenian version.

Not only that, but GERARD OF CREMONA (XII-2) translated it into Latin under the title, *De expositione bonitatis purae*, and it thus influenced Christian doctors, such as ALAN OF LILLE (XII-2). ALBERT THE GREAT (XIII-2), prepared a new edition of the Latin text, improving it and commenting upon it with reference to another (Arabic?) tradition of the Elements, and entitling it *Liber de causis et processu universitatis a causa prima*. This Albertian version was the source of the Neoplatonic ideas which can be traced in DANTE's *Convito* and *Commedia*.

III. *Other Proclian traditions.* — We may disregard the tradition of Proclian mathematics and astronomy, but his philosophy was transmitted by other books than his Elements of theology. The question is very complex, and we must bear in mind that Neoplatonic ideas could proceed also around PROCLOS, and independently of him, instead of through his intermediary. It will suffice to give a few indications.

Among the many treatises of the great Alexandrian doctor JOHN PHILOPONOS (VI-1) there is one not mentioned in my *Introduction* (1, 421) (2), the *De aeternitate mundi contra Proclum*. This did not refer to the

(1) One of these versions was made from the Arabic into Hebrew by ZERAḤIAH BEN ISAAC BEN SHEALTIEL GRACIAN (XIII-2); the three other versions were derived from GERARD's Latin translation, and were made respectively by HILLEL BEN SAMUEL (XIII-2), by LEONE ROMANO, i.e., JUDAH BEN MOSES HA-FILOSOF (XIV-1) and by ELIJAH BEN JOSEPH ḤABILLO (XV-2).

(2) I take this opportunity of repeating that JOHN PHILOPONOS and JOHN OF ALEXANDRIA (*Intr.* 1, 421, 480) are one and the same person. This has been proved by various scholars and the argument summarized by MAX MEYERHOF (1931; *Isis* 18, 447-48).

Elements wherein the infinity of the world is not proved, but to another work of PROCLOS lost or unidentified. That treatise of PHILOPONOS against PROCLOS was translated into Arabic.

AL-RÂZÎ (IX-2) also wrote a treatise against PROCLOS. It is no. 127 in the list given by AL-BÎRÛNÎ, as edited by RUSKA ("Die Zweifel gegen PROKLOS", *Isis* 5, 44, 1923).

Finally the Platonic revival which occurred in Constantinople under the COMNENI (1057-1185), included a revival of Proclian influences. For example, MICHAEL PSELLOS (XI-2) and NICEPHORAS GREGORAS (XIV-1) were acquainted with his works, namely with his treatise on Chaldean oracles. That treatise is lost, but another treatise of PROCLOS on the hieratic art of the Greeks has been preserved by PSELLOS and been recently edited by JOSEPH BIDEZ (*Catalogue des MSS alchimiques grecs*, vol. 6, 148-51, 1928; *Isis* 12, 165-68); see also BIDEZ's article in the *Mélanges Franz Cumont* (85-100, 1936; *Isis* 28, 163).

IV. *The Elements of Theology*. — I have kept the direct tradition of the Elements for the end because it began relatively late. To be sure the Syriac versions (if any) may have been made as early as the sixth or seventh century, but the Arabic one could hardly have appeared before the eighth or the ninth. The Greek text itself sank into oblivion until the eleventh century. MICHAEL PSELLOS was certainly acquainted with it. NICOLAOS bishop OF METHONE (in southern Greece; XII-2) wrote a refutation of it so elaborate and containing so many quotations from it that it is used as a source for the establishment of the Greek text. After his time we lose sight of the Greek text and the tradition turns around along a new oriental channel.

The Elements was translated into Georgian with a commentary, by JOHN PETRITSKI at the beginning of the twelfth century, and the Georgian text was translated into Armenian by SIMEON OF GARNI in 1248. To complete that particular account, we may add that a new Armenian commentary was made by bishop SIMEON OF DJULFA in the seventeenth century, and this was retranslated from Armenian into Georgian as late as 1757. The Armenian version and the two Georgian versions exist in MSS (See DODDS p. xxix, xli).

To return to the thirteenth century and to the West, WILLIAM OF MOERBEKE translated the Elements into Latin at Viterbo 1268 at the request of THOMAS AQUINAS, and the latter had thus plenty of time to use it before his death (1274). MOERBEKE's translation was used by other Latin doctors such as WITELO (who had met MOERBEKE at Viterbo 1269), especially by Dominicans such as DIETRICH OF FREIBERG (d. c. 1311) and BERTHOLD OF MOSBURG (fl. 1318).

NICHOLAS OF CUSA was very familiar with the Elements, as well as

with the Platonic Theology, and fed his own thoughts on them. Even as the Byzantine Platonic revival of the eleventh century had resurrected PROCLOS for Greek readers, the Florentine revival of the fifteenth produced the same result for the Latin readers. No less than three MSS of the Elements came from Cardinal BESSARION's library. MARSIGLIO FICINO wrote another, and PICO DELLA MIRANDOLA based his fifty-five propositions on PROCLOS. It is not necessary to continue the history beyond this point. Having weathered the vicissitudes of mediaeval times, the Elements was finally printed (1583) and could thus continue to exert its influence in endless ways and countless places.

DODDS' commentary is followed by two appendices on the "unknown God" in Neoplatonism (controverting EDUARD NORDEN's views in *Agnostos Theos*, 1913) and on the astral body. Both are interesting contributions to the study of oriental influences on western thought. I am not competent to discuss DODDS' edition from the technical point of view of the philologist, but it has apparently been done with loving care, and is very convenient.

GEORGE SARTON.

Edward Motley Pickman. — *The Mind of Latin Christendom.* New York, Oxford University Press, ix+738, 1937.

From the standpoint of the history of science itself only certain portions of this book are of interest, but for those who wish to see science in its historical setting among other fields of intellectual endeavour Mr. PICKMAN's book is of first-rate importance. "That the Latins dwelt hardly at all on political, economic, or scientific matters is a fact which the historian cannot ignore" (p. 384). "Before the year 406 the Church had only to prove herself a way of life within the State: after 430 she was obliged to prove her fitness as a way of life without it" (p. 337). The purpose of the book is to explain how these facts came to be; to study, in the light of the most recent researches, the critical transition period 373-496 when the last vestiges of the ancient world were giving to the Christian revelation the form which it was to have for the next fifteen hundred years. This problem is treated in the broadest of terms; the controversies over miracles and free will appear with their proper background of monasticism, the papacy, the bishops, and temporal events. The chapter, "Justice on Earth", is a brilliant and careful interweaving of the development of the Christian notions with the wane of the power of the Roman state and the decline of Roman law. Mr. PICKMAN has essayed a difficult task and done it extraordinarily well. His book is especially valuable because it is one of the very few accounts, and the only recent one, of the thought of this period not colored by either

theological or anti-religious sentiments. This virtue is also its principal fault in that Mr. PICKMAN's skepticism and legalistic turn of mind tend too often to assume that the fifth was the thirteenth century, and some times even the eighteenth. He therefore sometimes attributes a systematic and rationalistic habit of thought to figures whose ideas were far more often derived from faith and from the heat of controversy. This assumption results in several glaring cases of *post hoc* thinking and even two cases of *argumentum ad ignorantiam*, (e. g. p. 377, p. 552, n. 36). These are common faults of the historian, but are unhistorical. The historian of thought must be especially careful not to try to make history logical. It often is not.

The section in Mr. PICKMAN's book which will most interest historians of science is headed "Augustine on Science". It will, however, prove a trifle disappointing, for Mr. PICKMAN gives a brilliant account of why AUGUSTINE could not logically have been interested in science — in fact, must have been on the whole opposed to science, and hence could have had little influence on its development. This is another example of lego-logical thinking, which is not entirely in accord with the evidence. Mr. PICKMAN seems to have had a faint suspicion of this on page 499 in comparing the attitude of the Africans, the Gauls, and the Britons toward Nature. His account of Pope LEO's conception of science is of great importance as part of LEO's formulation of the Christian mind as it was to be until the eleventh century.

Mr. PICKMAN's very loose use of the word "science" as equivalent to "reason" or even to "common sense", especially in his chapter on "Miracles", is most annoying and confusing. That it confused Mr. PICKMAN also is evident in his proof of the statement that "in a very real sense, therefore, the monks were the scientists of this age; the only men who, as a class, disinterestedly sought to widen the bounds of human knowledge" (p. 478). Possibly the explanation of this confusion is to be found in the incredibly mixed and involved scientific metaphor on page 555.

The book is perhaps overly long and its parts not as well coordinated as they might have been made by frequent reference to the useful little table of contemporary men and events which follows the table of contents. The text has been carefully proofread except for several weak pronominal references, one or two at rather critical points. Mr. PICKMAN has furnished an index which is a model of thoroughness and convenience, as well as an excellent bibliography. There are 655 pages of text, 18 of bibliography, and 64 pages of index!

Mr. PICKMAN is the objective historian throughout until in the last two paragraphs of his book he has a brilliant and damning summary

of the mind of Latin Christendom culminating in a sentence straight out of eighteenth century skepticism : "From a roar, Revelation had dwindled to a whisper — into the Pope's ear".

Massachusetts Institute of Technology. ROBERT S. WOODBURY.

Paul Sbath et **Max Meyerhof.**—Le livre des questions sur l'œil de ḤONAIN IBN IṢḤÂQ. *Mémoires présentés à l'Institut d'Égypte*, 36, 147 p. Le Caire, Imprimerie de l'Institut français d'archéologie orientale, 1938.

Édition de ce traité arabe avec traduction française par le Père SBATH et une savante introduction par MEYERHOF. C'est l'un des premiers livres arabes sur l'œil, d'autant plus précieux que les livres grecs sur ce sujet ont tous disparu. " Le premier discours du *Livre des questions sur l'œil* concerne l'anatomie de l'œil et en partie sa physiologie; le deuxième les causes des maladies oculaires, et le troisième les maladies oculaires et leurs symptômes. Il n'est donc pas question de traitement dans ces trois discours. ḤONAIN lui-même renvoie le lecteur à son grand livre *Les dix discours sur l'œil* dont le dernier discours comprend la prescription des ordonnances. Il est donc probable que les *Dix discours* n'étaient pas encore réunis en un seul livre à l'époque où ḤONAIN a composé ses *Questions sur l'œil*. On peut conclure des propres paroles de ḤONAIN dans son dixième discours qu'il a réuni les discours précédents après l'année 860 ap. J.-C. : par conséquent il a dû composer les *Questions sur l'œil* avant ce terme, quand ses fils étaient des adolescents et étudiants en médecine." (p. 7). " Quant au contenu des *Questions sur l'œil*, ḤONAIN a puisé pour le premier discours (Anatomie et physiologie de l'œil) dans le livre *De usu partium* de GALIEN. Pour le deuxième discours (Causes des maladies) il a utilisé les traités galéniques *De morborum causis* et *De symptomatum causis*. Et pour le troisième discours (Symptômes des maladies oculaires) un traité perdu que GALIEN paraît avoir composé dans son jeune âge : *Sur le diagnostic des maladies des yeux.*" (p. 8) " L'importance historique du petit ' livre des questions sur l'œil ' de ḤONAIN IBN IṢḤÂQ réside dans le fait qu'il est un des premiers traités spéciaux d'ophtalmolgie venus jusqu'à nous, qu'il rend fidèlement la pensée anatomique, physiologique et pathologique des Grecs, concernant l'œil et supplée ainsi au manque d'un précis d'ophtalmologie théorique en langue grecque. C'est en plus, un exemple de la manière didactique que les médecins chrétiens syro-arabes ont employée pour transmettre les trésors scientifiques des Grecs au monde musulman du IX^{e} siècle de l'ère chrétienne. Et enfin, c'est une source précieuse des

termes scientifiques arabes créés par les mêmes médecins, et surtout par HONAIN lui-même, l'auteur de ce petit précis." (p. 11)

L'édition est basée sur un Ms. appartenant au P. SBATH (acquis par lui à Alep en 1933; daté 1671) mais il a tenu compte des 5 autres MSS déjà connus. Il a ajouté à la traduction française un glossaire des termes médicaux qui sera fort utile. G. S.

Christiaan Huygens (1629-95).—*Œuvres complètes de* CHRISTIAAN HUYGENS, publiées par la Société hollandaise des sciences. Tome dix-neuvième, Mécanique théorique et physique de 1666 à 1695. HUYGENS à l'Académie royale des sciences. 688 p. La Haye, MARTINUS NIJHOFF, 1937.

The volumes of this admirable edition have been announced to our readers just as soon as we heard of the publication of each, and after the publication of vol. XVII we wrote a general account of vols. I to XVII, 1888-1932 (*Isis* 21, 213-15). Vol. XVIII (1934) was announced more briefly (*Isis* 25, 215). The recent publication of vol. XIX gives us a welcome opportunity of speaking again of the whole collection, which is not as well known as it deserves to be. This is probably due to the fact that when a government (or an institution) spends a large amount of money on such a monumental publication it wrongly believes that it has done enough, does little if anything to advertize it, and even grudges review copies to scholars! The Editor of *Isis* has not received a single volume, and this has caused not the suppression of the reviews, for he would not think of retaliating in that way, but their unavoidable delay, for instead of knowing of the publication of each volume just as soon as it came out, he only knew of it indirectly as luck would have it.

In my general account (*Isis* 21, 213-5), I described briefly the contents of each volume; I shall now explain the circumstances of their edition. A special committee for the publication of HUYGENS' works was appointed by the Dutch Society of sciences in 1882. The most active members were DAVID BIERENS DE HAAN (1822-95) and JOHANNES BOSSCHA (1831-1911); the only surviving member is DIEDERIK JOHANNES KORTEWEG (born 1848). The present editor, JOHAN ADRIAAN VOLLGRAFF (b. in Haarlem in 1877), was asked by KORTEWEG to join the committee in 1910. From 1910 to 1928 the committee never met, its work being organized by KORTEWEG who corresponded or discussed with each member, especially with the illustrious physicist, HENDRIK ANTOON LORENTZ (1853-1928), who was the secretary of the Society sponsoring the undertaking. VOLLGRAFF had obtained his doctor's degree in mathematics and physics in Leiden 1903, his thesis being devoted to electro-

magnetic rotations and unipolar induction. He was taken into the committee because he was not only a very well trained mathematician and physicist, but also a good Latinist and French scholar (a combination of qualities which is becoming rarer every day). His first assignment was thus to translate various texts from Latin into French. He did so for the *Dioptrica* (vol. XIV, 1920) and for many of the astronomical writings (vol. XV, 1925). When vol. XVI was being prepared, KORTEWEG resigned (1927) and asked Dr. VOLLGRAFF and Dr. EDUARD JAN DIJKSTERHUIS (born 1892) to replace him. However, when LORENTZ returned from America, he was appointed by the Society, as KORTEWEG's successor, but as he had obviously no time for historical work he himself appointed VOLLGRAFF his secretary. Thus LORENTZ was the president of the committee and VOLLGRAFF, the secretary and the effective editor (1).

At about that time (December 1927) the Director of the Leiden University Library ordered the return to his library of the HUYGENS' MSS. (2) which had been loaned to KORTEWEG in Haarlem, and thus VOLLGRAFF who was then living in Middelburg was obliged to spend three days of each week in Leiden for the HUYGENS work.

The edition of vol. XVI (1929), begun by KORTEWEG, was completed by VOLLGRAFF and DIJKSTERHUIS. Vol. XVII (1932), vol. XVIII (1934), and the present vol. XIX (1937) have been edited by VOLLGRAFF, who has done his task with the utmost skill and faithfulness

Let us now say a few words of the new volume. A complete analysis of it is obviously out of the question, for it deals with a number of important topics each of which would deserve an elaborate study. I must restrict myself to a bare indication of the main contents. These are defined in the title " Theoretical and physical mechanics from 1666 to 1695 (i.e., from aet. 37 to 66, when HUYGENS died). HUYGENS at the Parisian Academy of science." This is divided as follows. Statics; dynamics; airpump; programs of research in astronomy and physics; meteorology; properties of matter; sound, light, ether (matière subtile, 1667), magnetism, electricity, gravitation. Each of these sections is introduced by an editorial " avertissement " bringing out the main

(1) After LORENTZ' death (1928), the Dutch Society appointed in his stead ARNOLD FREDERIK HOLLEMAN (b. 1859), who is still president, with VOLLGRAFF as secretary. HOLLEMAN was a very distinguished professor of organic chemistry, without special interest in the history of science. LORENTZ' appointment was defensible, for LORENTZ was a man of genius whose curiosity was universal, a man who could interest himself deeply in HUYGENS' achievements and could understand and appreciate them even if he had no time for investigations. HOLLEMAN's appointement on the other hand was indefensible, just the kind of stupidity and injustice perpetrated in that very form all over the world.

(2) HUYGENS had bequeathed them to that library.

points. The proper way of using this work is to read the " avertissements " first, then refer to the original texts as far as needed. Consultation of it is greatly facilitated by an elaborate index of persons and institutions, of books quoted, and of subjects (e.g., capillarité, elasticité, éther, fluxions, horloges, vitesse de la lumière). Thanks to these excellent indices the HUYGENS Opera constitute a working tool of the very first order, which the student of seventeenth century science should always keep at his elbow.

To conclude, I feel it my duty to add this. This edition of HUYGENS' works is admirable. It does credit to the *Hollandsche Maatschappij* which is thus giving to the world the best example of intelligent patriotism. As the fame of a nation depends very largely on its famous men—and especially its men of science and men of letters—there is no finer way of exalting one's fatherland than by raising monuments to its illustrious children, and there can be no greater monument than the complete and faithful publication of their achievements. However, anonymous editorship is all wrong. The editor's task is a very difficult one, full of pitfalls; it is also highly individual. We wish to be able to place the praise and blame where it belongs. The anonymous arrangement is unfair, for the committee receive undeserved credit for the editor's work, while if his work were blamed, they would quickly denounce him. Let the responsible editor, not the irresponsible committee, receive his reward. In this particular case it must be a great reward, for Dr. VOLLGRAFF has built for the Netherlands, for HUYGENS, for the *Hollandsche Maatschappij*, and for himself, a monument *aere perennius*.

GEORGE SARTON.

Eugene Fairfield MacPike.—*Hevelius, Flamsteed and Halley. Three contemporary astronomers and their mutual relations.* x + 140 pp., ill.; London, TAYLOR and FRANCIS, Ltd., 1937; 12 s. 6 d. net.

Nous devions déjà à M. MACPIKE : *Correspondence and papers of Edmond Halley* (1932; *Isis*, 20, 470-472), intéressant recueil de documents pour servir à l'histoire du plus sympathique peut-être des savants anglais du XVII^e siècle. Son nouvel ouvrage est d'une valeur moindre, et constitue tout au plus un modeste supplément au livre paru en 1932.

Les trois premiers chapitres sont de brèves esquisses consacrées respectivement à HEVELIUS (1611-1687), FLAMSTEED (1646-1719) et HALLEY (1656(?)-1741/2). Un dernier chapitre étudie les relations mutuelles de ces savants; basé sur des documents parfois inédits, c'est la seule partie du livre présentant quelque originalité. Des documents figurant dans les appendices, seule une lettre de la femme d'HEVELIUS

(nov. 1687) est inédite (pp. 117-118). On se demande pourquoi les documents de Greenwich et de Paris n'ont pas été davantage étudiés par l'auteur. (A propos des documents de Paris, voir *Nature*, 141, 29 janv. 1938, p. 194). D'autre part, il est regrettable que l'auteur ignore la littérature de son sujet : c'est ainsi qu'il doute (p. 46) de l'existence d'une lettre de NEWTON publiée en réalité il y a plusieurs années déjà (*Isis*, 12, 237-254).

L'ouvrage est imprimé avec soin; l'index onomastique est excellent.

JEAN PELSENEER.

Lavoisier.—*Traité Élémentaire de Chimie*. Avant-propos par M. HENRY LE CHATELIER. (*Classiques de la Découverte Scientifique*). GAUTHIER-VILLARS, Paris, 1937. xxxviii + 191 pages. 21 francs.

Students will be glad to have an inexpensive reprint of LAVOISIER's classic textbook, but the present reprint will not fill the bill. It is incomplete. The entire Second Part of the work has been suppressed

"parce qu'il est consacré à l'énumération des combinaisons chimiques connues à l'époque de LAVOISIER. Le nombre des combinaisons connues aujourd'hui est devenu si considérable, que la liste restreinte de LAVOISIER ne présenterait plus d'intérêt.

"Le Tome III a été reproduit en partie seulement. On a supprimé certains chapitres ayant perdu leur intérêt, comme ceux sur la fabrication des luts, sur la porphyrisation, sur la filtration. D'autres chapitres ont été laisses de côté parce qu'ils doivent être reproduits dans d'autres volumes de la même collection, par example ceux qui se rapportent à la dissolution ou à l'analyse organique.

"On a cependant conservé dans la Table des Matières les titres des chapitres supprimés, mais en ne mettant pas en regard les chiffres des pages."

What editor can pretend to guess the motives which attract a student to the study of a classic? The dull and seemingly unimportant parts are interesting and significant because they show the character of the author, the state of knowledge in his time, the difficulties under which he worked. A reprint ought to be complete, in order that scholars may use it as if it were the original. Commentaries are helpful, but deletions are disappointments.

The Preface is followed by a bibliographical note which contains information which is distinctly misleading.

"Le *Traité élémentaire de Chimie* de LAVOISIER a été édité en 1789 chez CUCHET, Libraire, rue et hôtel Serpente, en deux volumes in -8°.

"Il a été réimprimé en 1801 chez DÉTERVILLE, libraire, rue du Battoir n° 16, quartier de l'Odéon, en deux volumes in-8°.

"D'autre part, les *Œuvres complètes* de LAVOISIER ont été réunies et publiées en 1804, aux frais de l'État français, en six volumes in-4°, imprimés à Paris (Imprimerie impériale)."

The facts relative to the earliest editions are these; the first edition was published in 1789 *chez Cuchet*, two volumes with continuous pagination; a second printing of the same year, often considered the second edition, differs from the first printing only in the respect that the pages of the two volumes are numbered separately; and an edition, often considered the third but designated on the title-page as the *Seconde Édition*, was published in 1793, *chez Cuchet*, two volumes paginated separately.

TENNEY L. DAVIS.

Jonathan Kemp (Editor). — *Diderot Interpreter of Nature*. 358 p., London : LAWRENCE & WISHART, 1937, (10/6).

This volume consists of selections from the writings of DENIS DIDEROT (1713-1784) particularly chosen to illustrate the claim that DIDEROT may be regarded as among the first of the dialectical materialists ! The claim is seriously made, and there will be few, I imagine, who are acquainted with the writings of DIDEROT who will care to dispute DIDEROT's claim to a place in the Marxian Pantheon. As a matter of fact, MARX, ENGELS, and LENIN, were all great admirers of DIDEROT, and these thinkers admired chiefly those who thought like themselves; not that they were in this respect exceptional, but the fact that they did think highly of DIDEROT would lend added force to Mr. KEMP's claim. In this book DIDEROT is made to substantiate the claim himself, in the able translation of Miss JEAN STEWART and Mr. JONATHAN KEMP, the editor. I must confess that I had not thought of DIDEROT as a dialectical materialist. The Director and Editor of the *Encyclopédie* is, I suppose, fixed in the mind of most students of the 18th century as a Rationalist or Materialist, but that his influence extended beyond the French Revolution which he helped to bring about but did not live to see, has not so far been particularly clear to any but careful readers of the writings of MARX, ENGELS, and LENIN. Mr. KEMP has, therefore, performed a useful service in making clear DENIS DIDEROT's influence upon these thinkers.

The questioning spirit of DIDEROT has, indeed, been incarnated in MARX, though DIDEROT was by no means as solemn as MARX in the expression of it. MARX is really the logical conclusion of DIDEROT, but it is greatly to be doubted whether the smiling DIDEROT would have approved the solemn violent-spirited seriousness of the completely humourless Marxian who to-day shouts the doctrine of the new religion into the ears of the universe. DIDEROT, there is reason to believe, would have thought such conduct silly and vulgar.

DIDEROT exerted an enormous influence upon the direction of the liberal opinion of his day, and, apart from the intrinsic soundness of

his views, this he was able to do chiefly because he realized that a certain amount of discretion in the statement of his views and those of his contributors to the *Encyclopédie* was necessary if he was to acheive what he set out to accomplish. Some Marxists could learn a great deal from DIDEROT, — it is to be hoped that this volume will help.

New York University. M. F. ASHLEY-MONTAGU.

J. B. Dumas. — *Leçons de Philosophie Chimique.* Avant-propos par M. GEORGES URBAIN. *(Classiques de la Découverte Scientifique).* GAUTHIER-VILLARS, Paris, 1937. xxviii+270 pages. 21 francs.

Eleven brilliant lectures delivered at the Collège de France in the spring of 1836. "Depuis J. B. DUMAS, nul chimiste français ne s'est risqué à écrire ou à professer une "Philosophie chimique". Quel meilleur éloge pourrait-on faire du livre, unique en son genre, que nous a légué ce Maître inégalable?"

"La Philosophie chimique (à peine si j'ose la définir) a pour objet de remonter aux principes généraux de la Science, de montrer non seulement en quoi ils consistent aujourd'hui, mais encore quelles sont les diverses phases par lesquelles ils ont passé, de donner l'explication la plus générale des phénomènes chimiques, d'établir la liaison qui existe entre les faits observés et la cause même de ces faits.

"La Philosophie chimique fait abstraction des propriétés spéciales des corps; elle met de côté les particularités qu'ils peuvent présenter, et n'examine que l'essence des diverses réactions. Prise au point de vue de la Chimie actuelle, elle se compose de l'étude générale des particules matérielles que les chimistes appelent *atomes*, et de celle des forces auxquelles sont soumises ces particules. Ainsi, elle comprend la recherche de toutes les propriétés des atomes, l'examen de l'action chimique, de ses effets, de sa cause et de ses diverses modifications; elle cherche à démêler les rapports de ressemblance et de dissemblance que présentent les corps de la nature, et elle essaye d'en découvrir les causes secrètes.

"Je pourrais donc, bornant là son rôle, vous dire comment la Science peut s'envisager en partant des principes admis aujourd'hui; mais vous trouverez plus utile d'examiner comment elle s'est donné ces mêmes principes, comment s'est formée sa manière d'expérimenter, comment s'est fixée la marche de sa logique. Vous aimerez à suivre ses progrès depuis son origine jusqu'à ce jour, et même à prévoir, autant qu'il est permis de le faire, les découvertes prochaines qu'elle nous promet."

URBAIN estimates that "un bon quart" of the book relates to the history of chemistry, and the judgement is good as concerns the material which was history in the time of DUMAS. But the substance of the rest of the book, being a discussion of the chemistry of a century ago by the chemist himself who established the principle of substitution in organic chemistry and laid the foundations of structure theory, is history now. DUMAS gave careful study to the history of chemistry.

"Son préambule historique est riche d'enseignements. Il y signale des antériorités qui, aujourd'hui encore, sont négligées ou méconnues : c'est LAPLACE et LAVOISIER, réalisant avant VOLTA, la première expérience électrochimique; c'est FOURCROY donnant avant GROTTHUS la première théorie de la décomposition de l'eau par la pile; c'est DAVY considérant avant GERHARDT tous les acides comme des composés hydrogénés; c'est AMPERE avant FARADAY imiganant les atomes portant des charges, les unes positives, les autres négatives, à la manière des ions."

The table of contents is sufficiently detailed to be of real use.

TENNEY L. DAVIS.

Alfred Lacroix.—*Figures de savants.* Tome I, x + 325 p., 32 pl. Tome II, 357 p., 26 pl. Paris, GAUTHIER-VILLARS, 1932. Tome III et IV, *L'Académie des sciences et l'étude de la France d'outre-mer de la fin du XVII^e siècle au début du XIX^e.* XIII + 220 p., 38 pl.; 259 p., 59 pl. Paris, GAUTHIER-VILLARS, 1938 (Les vols. III et IV coûtent 125 frs. et 150 frs.).

Je rappelle dans le titre les deux premiers volumes de cette belle collection qui ont été brièvement analysés dans *Isis* (19, 309). Les quatre volumes représentent l'activité de M. LACROIX, en sa qualité de Secrétaire perpétuel de l'Académie des sciences pour les sciences physiques (depuis 1914). Tous les secrétaires ne sont pas également actifs en tant qu'historiens, et dans sa section, il n'y a que GEORGES CUVIER (secr. 1803-32) et MARCELIN BERTHELOT (secr. 1889-1907) qui peuvent lui être comparés à ce point de vue. Nous lui devons aussi une belle étude sur DÉODAT DOLOMIEU (1750-1801), deux volumes bourrés de documents publiés en 1922 (*Isis* 5, 158-59).

Les volumes III et IV ont l'avantage de n'être pas seulement une collection de biographies disparates, mais une étude d'ensemble sur « L'Académie des sciences et l'étude de la France d'outre-mer de la fin du XVII^e siècle au début du XIX^e » où les biographies s'enchassent chacune à leur place. Je les ai lus avec d'autant plus de plaisir que l'étude de ce qu'on pourrait appeler « la science coloniale » m'intéresse davantage. Cet intérêt a été fortement accentué par deux voyages aux Antilles que j'ai eu le privilège de faire en 1933 et 1936. Le premier m'a conduit à la Jamaïque, la Colombie et le Panama; le second aux Bermudes, aux petites Antilles et à la Guyane. Au cours de ces navigations je n'ai pu m'empêcher de penser souvent aux vicissitudes de ces îles merveilleuses qui auraient pu devenir de petits paradis sans la cupidité et la cruauté humaines. Les spécialistes de l'histoire coloniale n'en connaissent généralement que le coté militaire et commercial, une histoire où beaucoup d'héroïsme se mêle à infiniment plus de bêtise, de jalousie, de méchanceté, et de vraie bestialité. Il est bon de leur rappeler qu'il y a un autre côté,

dont la gloire n'est point ternie par tant de crimes, le côté scientifique, l'exploration méthodique de ces pays lointains, l'éducation de leurs habitants, leur intégration dans la grande famille humaine.

M. LACROIX ne s'est pas du tout occupé des questions d'éducation et il s'est naturellement borné aux savants français, et surtout à ceux qui furent membres de l'Académie ou qui furent en contact avec elle, mais nous ne pouvons nous en plaindre, car il a accompli cette tâche, d'ailleurs considérable, avec beaucoup de conscience et d'exactitude.

"Un ordre géographique a été suivi pour l'exposé de la vie et de l'œuvre de chacun des hommes de science ayant travaillé dans les trois grands groupes des colonies tropicales existant au cours de la période considérée, c'est-à-dire : I. Antilles et Guyane; II. Mascareignes, Madagascar, Indes; III. Afrique occidentale. Dans ces groupes, sauf exception, l'ordre chronologique a été suivi. Le chapitre III est consacré à la dynastie des médecins botanistes de JUSSIEU qui, pendant 150 ans (de 1712 à 1853), ont tenu sans interruption une place de premier plan à l'Académie et au Jardin du Roi. Tout en édifiant cette *Méthode naturelle*, d'une telle importance dans les sciences de la nature, qui est leur titre de gloire, BERNARD et ANTOINE-LAURENT DE JUSSIEU, aussi bien que leur ainé, ANTOINE, ont joué un rôle d'animateurs de la recherche scientifique dans nos colonies, et l'on verra maintes fois dans ces deux volumes apparaître, en dehors du chapitre qui leur est propre, la trace de leur influence, ainsi que de celle de RÉAUMUR, leur contemporain, et de FAGON qui les avait précédés."

Les savants coloniaux ont été des astronomes, géographes, hydrographes, mais surtout des naturalistes, des botanistes.

Ce sont les sciences naturelles "et particulièrement la botanique, qui ont joué le rôle principal ou exclusif dans les préoccupations du plus grand nombre des explorateurs, et, là encore, à deux points de vue. Il s'agissait d'étudier la flore tropicale de pays où tout était à découvrir, et ce genre de recherches s'est montré d'une exceptionnelle importance, en raison de la disparition rapide de la forêt primitive, et, comme conséquence, de la faune autochtone, par suite de la destruction à l'aide de la hache ou du feu depuis longtemps commencée par les indigènes, mais accentuée par la cupidité et l'inconscience de l'homme civilisé, par suite de la transformation rapide en savanes stériles ou en déserts de régions boisées, naguère florissantes. J'aurai souvent l'occasion de revenir sur cette question si grave pour l'avenir de nos colonies. Les recherches botaniques d'ordre pratique ont été d'un prix considérable et ont fourni, elles, des résultats bienfaisants, durables. Il s'est agi, en effet, de transporter de l'est à l'ouest et de l'ouest à l'est du vaste monde, avec relais dans des jardins botaniques créés à l'Ile de France et dans le Jardin du Roi à Paris, tous les végétaux utilisables et acclimatables d'une colonie ou d'un pays étranger dans un autre, et c'est ainsi que ce genre de recherches, dont POIVRE a été le représentant le plus qualifié, a permis de diffuser à travers tout l'univers tropical les mêmes végétaux utiles à l'homme, tels que le Café, le Cacao, les arbres à épices, la Canne à sucre, le Quinquina, le Manioc, et une foule d'autres. Dans cette grande œuvre de recherches, les produits minéraux ne jouent qu'un rôle restreint et ceci s'explique aisément, les découvertes minéralogiques ne se font pas facilement au cours d'une exploration rapide, et par ailleurs la géologie n'a pris son nom qu'à la fin du XVIII^{e} siècle; il n'est donc pas étonnant que les notions fournies à cet égard par

des voyageurs non spécialisés aient été modestes. Je tiens cependant à signaler quelques observations sur les manifestations des volcans des Antilles et de l'Ile Bourbon" (1).

Le nombre des savants dont l'auteur a été amené à s'occuper est si grand, que je ne puis songer à les nommer tous. J'en citerai quelques uns seulement, à titre d'exemples, en ajoutant quelques remarques pour aider le lecteur.

JEAN RICHER (1630-96), variation de longueur du pendule à seconde; LA CONDAMINE (1701-74); JEAN BAPTISTE LEBLONG (1747-1815); NICOLAS-LOUIS DE LA CAILLE (1713-62); ALEXANDRE PINGRÉ (1711-96), l'auteur de la *Cométographie*, esprit fort curieux (ce qui rend la lecture de ce livre si agréable, c'est le fait que la plupart de ces « coloniaux » étaient des « originaux » dont la vie était beaucoup plus diversifiée et pittoresque que celles de leurs confrères parisiens), PIERRE POIVRE (1719-86), au nom prédestiné, car ce fut le grand homme de la conquête des épices.

Dans le vol. IV, nous faisons connaissance, parmi beaucoup d'autres, avec les collaborateurs de POIVRE : PHILIBERT COMMERSON (1727-73) et sa fidèle servante JEANNE BARRÉ « qui fut la première femme à faire le tour du monde », ALEXIS-MARIE ROCHON (1741-1817), PIERRE SONNERAT (1748-1814). Puis avec JOSEPH-FRANÇOIS CHARPENTIER DE COSSIGNY DE PALMA (1730-1809), JOSEPH-HENRI HUBERT (né et mort à la Réunion, 1747-1825) YVES-JOSEPH DE KERGUÉLEN (1734-97), le vicomte DE PAGÈS (1740-92), le comte de LAPÉROUSE (1741-88), D'ENTRECASTEAUX (1740-93), AUBERT AUBERT-DU PETIT-THOUARS (1758-1831), ANDRÉ MICHAUX (1746-1803). Les cinq DE JUSSIEU, une des plus illustres familles de savants. MICHEL ADANSON (1727-1806), PALISOT DE BEAUVOIS (1752-1820), GUY-CRESCENT FAGON (1638-1718). Je le répète, je n'ai cité que quelques noms, ceux qui m'ont paru les plus importants; le lecteur en aura sans doute reconnu plusieurs. Il faut encore que j'en nomme un, JEAN-BAPTISTE LISLET-GEOFFROY né et mort (1755-1836) à l'Ile-de-France (Mauritius), dans les Mascareignes, où il se distingua sous l'administration des Français, puis sous celle des Anglais. C'est le seul homme de couleur qui ait été attaché à l'Académie des sciences (2).

Quoique M. LACROIX se soit donné des peines infinies pour n'oublier personne, il est assez remarquable qu'il ait négligé deux académiciens illustres. Le premier c'est COULOMB (1736-1806), qui commença sa

(1) L'Ile Bourbon, c'est La Réunion, une des Mascareignes, dans l'Océan Indien. Le nom La Réunion fut sanctionné par le géomètre GASPARD MONGE en 1793, pour des raisons politiques. Voir LACROIX, IV, 95-8, pl. XXXI (G.S.).

(2) Il fut élu correspondant du Duc de la ROCHEFOUCAULD en 1786. Les correspondants de l'ancienne académie étaient fort différents de ceux d'aujourd'hui. Ils n'étaient pas membres, mais correspondants de membres, leurs employés en somme (LACROIX III, 7).

carrière d'ingénieur militaire à la Martinique où il passa neuf ans. L'autre c'est le grand historien des mathématiques, MONTUCLA (1725-99) auquel j'ai consacré une notice assez détaillée dans *Osiris* (1, 519-67, 12 fig., 1936). MONTUCLA fut astronome du Roy en Guyane (1764-65), et fut mêlé à la terrible aventure de colonisation du Kourou. Il n'en a guère parlé, mais j'imagine que les survivants furent avisés de se tenir cois. À propos de la Guyane, peut-être il aurait fallu dire quelques mots aussi des royalistes qui y furent déportés par le Directoire (Sept. 4, 1797). Les survivants de cette seconde aventure, aussi cruelle que la première, n'eurent pas la bouche cousue. Plusieurs écrivirent des livres (je les cite à la p. 524 de mon mémoire sur MONTUCLA), et il est fort possible que ces livres contiennent des indications intéressantes sur leur pays d'exil et de torture.

Le travail de M. LACROIX est de tout premier ordre, car il est largement fondé sur des documents d'archives, surtout les riches archives de l'Académie, qu'il a su habilement exploiter. Cela lui a permis de corriger plusieurs erreurs publiées dans les dictionnaires de biographie et souvent copiées (elles le seront encore, hélas !).

Mes seuls regrets, c'est que les indications bibliographiques ne soient pas plus nombreuses et plus précises, et que l'index des personnes n'ait pas été complété par un index des sujets. Celui-ci aurait fait ressortir la grande richesse de cet ouvrage et en aurait facilité l'utilisation. Par exemple nous apprenons dans le tome IV (p. 41) que JOSEPH-HENRI HUBERT avait reconnu à la Réunion la chaleur de fécondation de l'*arum* indépendamment de LAMARCK, (p. 115) que MICHEL SARRASIN avait étudié avant 1730 les érables à sucre, (p. 126) que le fameux Cèdre du Liban du Jardin des Plantes fut rapporté par BERNARD DE JUSSIEU de Londres en 1727 (non pas du Liban dans son chapeau !), (p. 178) qu'ADRIEN DE JUSSIEU écrivit une histoire de la taxonomie végétale en 1848, (p. 117) que le père jésuite ANTOINE GAUBIL (1689-1759) avait signalé l'existence d'un âge de la pierre en Chine, (p. 123) qu'ANTOINE DE JUSSIEU fut dès 1723 un précurseur en préhistoire. Comment peut-on se rappeler ces faits et les retrouver aisément sans index ? Un index des lieux eut été aussi fort utile, car il est souvent question, par exemple, de la Guyane, en dehors des chapitres qui lui sont consacrés.

L'ouvrage contient une admirable collection de portraits et de fac-similés d'autographes, tous proprement libellés, et son impression fait honneur à l'éditeur, GAUTHIER-VILLARS, dont l'éloge n'est plus à faire.

GEORGE SARTON.

J. M. D. Olmsted.—*Claude Bernard, Physiologist.* XVI+272 pp. New York : HARPER & Brothers, 1938, ($ 4.00).

MICHAEL FOSTER's *Claude Bernard* (London, 1899) has for many

years been out of print and hard to come by. Professor OLMSTED's authoritative biography, which appears exactly fifty years after BERNARD's death, therefore supplies a long-felt want. It may at once be said that the present work constitutes the most complete and most reliable account of BERNARD (1813-1878) and his works that has so far appeared. While BERNARD's life and work both lend themselves to dramatic treatment, Professor OLMSTED has avoided all temptation to pander to the at present fashionable taste in scientific biography, and gives us a formal, almost a severe, account of the man and his works. The author set out to write an academic biography, and an academic biography he has achieved; as such it is a most excellent piece of work, and may be warmly and unreservedly recommended.

Professor OLMSTED has succeeded in bringing much new material to light, the greater part of which he has himself examined and copied. The previously untapped resources of the RAFFALOVICH correspondence are here for the first time used to throw an interesting light upon BERNARD's later years; many other fresh sources of information have also been utilised in adding new facts to our knowledge of the man. Yet somehow the personality of BERNARD fails to emerge and to assume some definite form. That BERNARD was a remarkable personality there is abundant evidence to show, yet neither the anecdotes, the personal recollections of his pupils, the stories, the letters, nor the work have ever been put together in such a way as to create a living picture of the man as he was. In this respect PASTEUR, BERNARD's contemporary and friend, has been better served even though, as Professor OLMSTED points out, there is to-day no more reason than there ever was to reverse the positions which they respectively occupied in the scientific esteem of their contemporaries.

The author's account of BERNARD's physiological experiments, discoveries, and writings is the best that we have so far been given, but if a criticism may be ventured, it suffers somewhat from the fact that BERNARD's work has not been considered against a broad enough background of contemporary scientific endeavour and thought; but this is a quibble, for Professor OLMSTED does not pretend to be more than the recorder of BERNARD's life and work.

There is a foreword by ALEXIS CARREL who is careful to note that BERNARD's father was a religious man; he does not, however, make any reference to the fact that BERNARD himself was an agnostic. There are ten illustrations, a list of references, and an index.

New York University. M. F. ASHLEY-MONTAGU.

Richard Anschütz. — AUGUST KEKULÉ. In 2 Ganzleinen-Bänden, 1708 Seiten in Lex. 8°. Berlin, Verlag Chemie. Band I : Leben und Wirken, 732 Seiten mit Titelbild, 119 Abbildungen und 1 Faksimile. Jetzt nur 12,50 Mark. Band II : Abhandlungen, Berichte, Kritiken, Artikel, Reden, 976 Seiten mit 5 Abbildungen und 3 Tafeln. Jetzt nur 10 Mark. Beide Bände zusammen zum Vorzugs-Angebot von 18 Mark.

Endlich ist das seiner Zeit auf etwas unerschwinglicher Ladenpreis-Höhe stehende Gross-Bio KEKULÉS auch für gewöhnliche Sterbliche erschwingbar geworden, wofür man dem Verlag Dank a priori sagen muss. In diesem Werk setzte der — inzwischen ebenfalls verstorbene — Schüler-Assistent R. ANSCHÜTZ seinem Meister und Freund A. KEKULÉ ein würdiges literarisches Denkmal, das uns die überragende Persönlichkeit in seinem Leben, Wirken und Werken in jeder Hinsicht nahe bringt. Wer in diesen Bänden zunächst nur blättert, um sich die vielen Bilder anzusehen, wird nach und nach immer mehr in den Bann der ANSCHÜTZ'schen Darstellung wie der KEKULÉ'schen Briefe usw. gezogen. Was man dann aus einer mehr oder weniger eingehenden Lektüre dabei gewinnt, ist letztlich eine reizvolle Ein- und Übersicht über eine wichtige Zeitepoche der Chemie überhaupt, über ein Stück klassischer Chemie-Geschichte, ganz im Sinne von KEKULÉ selbst, der z.B. auch in seinen Vorlesungen „besondern Wert auf die Geschichte der Chemie (legte)" (Vergl. Bd. I, S. 468). Durch nichts charakterisiert sich das Wesen KEKULÉ's so, wie durch eine en-passant-Bemerkung über sich selbst in einem Briefe vom 4. Dez. 1858 an WELTZIEN (Bd. I, S. 143) : „...indessen wissen Sie selbst, dass für mich Zufriedenheit der Tod", und durch seine, sein Verdienst um die Begründung der Benzolstruktur-Chemie auf das richtige Mass selbst zurückführende Rede, bei der ihm zu Ehren veranstalteten Feier der Deutschen Chemischen Gesellschaft im Rathaus der Stadt Berlin im Jahre 1890 (Bd. II, S. 937-947). Wenn er hierbei z.B. sagte : „Etwas absolut Neues ist noch niemals gedacht worden, sicher nicht in der Chemie". (L. c., S. 939)... „Man hat gesagt, die Benzoltheorie sei, gewappnet wie Pallas Athene, dem Haupt eines chemischen Zeus entsprungen. Das mag vielleicht so ausgesehen haben, aber wenn es selbst so aussah, so war es nicht so". (L. c., S. 940)... „Man hat von Genie gesprochen und die Benzoltheorie als genial bezeichnet. Ich habe mich oft gefragt : was ist eigentlich genial, was ist ein Genie?" (L. c., S. 941)... „ich habe niemals für die Technik gearbeitet, immer nur für die Wissenschaft" (L. c., S. 946) usw., so kann man nur sagen : Ecce KEKULÉ ! — ANSCHÜTZ, der KEKULÉ 21 Jahre zur Seite gestanden, hat sein Bio über ihn bereits seit 1896 in Angriff genommen, das Werk ist also später als HORAZ in seinem „Nonum prematur

in annum" verlangt, herausgekommen. Zu bemängeln ist nicht viel, nur einige Kleinigkeiten : Im Band I, S. 141 ist vermerkt, dass KEKULÉ Heidelberg gerade dann verliess — um einem Rufe nach Gent (in Belgien) zu folgen — als es „gerade wieder die Augen der ganzen wissenschaftlichen Welt durch die Entdeckung der Spektralanalyse von KIRCHHOFF und BUNSEN auf sich gezogen hatte". Das ist ein kleiner Anachronismus. Denn die Spektralanalyse wurde erst 1859-60 der Welt bekannt und KEKULÉ war bereits Dezember 1858 in Gent (Vergl. obigen Brief an WELTZIEN, der aus Gent datiert !). — Bd. I, S. 383 ist von KOPP erwähnt „Eine Zeitlang besorgte HERM. KOPP die Redaktionsgeschäfte der Annalen..." Das war aber schon ein ganzes Menschenalter ! — Bd. I, S. 132 vindiziert ANSCHÜTZ SCHLOSSBERGER die Prägung des Ausdrucks „Ester" in dessen Lehrbuch von 1857 und sich selbst die Auffindung dieser Quelle : „...nur wer der Erfinder des Namens Ester war, hatte man vergessen, bis ich ihn (NB ! bei SCHLOSSBERGER meint ANSCHÜTZ) entdeckte". Das ist ein bedenklicher Irrtum ! Bereits 1910 habe ich (Chemiker-Zeitung, Köthen, 1910, Band 34, Seite 194, Spalte 2) darauf hingewiesen, dass die Prägung des Wortbegriffes „Ester" von LEOPOLD GMELIN, in seinem 1848 in Heidelberg erschienenen Handbuch der organischen Chemie, dort Band I, S. 160 bei Ätherarten, erfolgt ist, also 9 Jahre *vor* SCHLOSSBERGER ! Letzterer hat das Wort von GMELIN übernommen ! Dazu gibt ANSCHÜTZ in seinem Bd. I, S. 96, Fussnote, eine Abhandlung WILLIAMSON's von 1852 an, die bei ihm „On Esterification" zitiert ist. Darnach hätte ja schon WILLIAMSON in London den Ausdruck „Ester" geprägt ! *Vor* SCHLOSSBERGER ! Aber auch das ist ein Versehen von ANSCHÜTZ. Die WILLIAMSON'sche Abhandlung von 1852 heisst in Wirklichkeit" On Etherification" ! Diesen Titel hat ANSCHÜTZ vorher (Bd. I. S. 48, Fussnote 2) richtig angegeben, dort aber dafür ein falsches Erscheinungsjahr (1851 statt 1852) zitiert. — Dass im ganzen Werk überall, statt richtig THENARD, falsch THÉNARD steht, ist nur nebenbei erwähnenswert. — Drei Seiten Druckfehler-Berichtigungen zu den beiden Bänden auf Sonderblättern sind zu berücksichtigen. — Diese kleinen Fehler, auf 1708 Seiten, zeigen, wie sorgfältig dieses schöne und nützliche Werk bearbeitet worden ist. Man ergreife die sich noch bietende Gelegenheit, um sich das Werk bald anzuschaffen !

Berlin. MAX SPETER.

Baroness **Constantin von Economo** and Professor **J. von Wagner-Jauregg.**—BARON CONSTANTIN VON ECONOMO (1876-1931). *His life and work.* Translated from the second German edition by RAMSAY

SPILLMAN, M. D. x+126 p., 5 pls. (portraits), 19 figs. in text. Burlington, Vermont, Free Press Interstate Printing Corp., 1937.

Synthesis is one of the major intellectual processes of science. It follows hard upon analyses in diverse independent fields when some comprehending analyst or keen observer turns synthesizer and correlates significant aspects of hitherto unrelated fields of research in new and enlarging interpretations of perplexing problems arising from complex interrelations of several factors. Such an analyst and synthesist was the subject of this biography. He was a Roumanian Greek of a prominent Macedonian family of Edessa, the birthplace of ALEXANDER THE GREAT. He was a brilliant and versatile poet, student, linguist, sportsman, traveller, and had a knack of seeking out the ablest teachers while a student of medicine, to which field he turned after two years of study of engineering. He was demonstrator in histology under EBNER, assistant in physiology under EXNER, student of internal medicine under NOTHNAGEL, of psychiatry under JEOFFREY, MAGNAN, BERNHEIM, and KRAEPELIN, of neurology under MARIE, RAYMOND, BETHE, EWALD, ZIEHEN, and OPPENHEIM. In 1906 he returned to Vienna as assistant in the psychiatric clinic of WAGNER-JAUREGG and as a side issue took up ballooning and later aeroplaning.

His scientific work was now along neurological lines, on sensory disturbances in tumors of the pons, sensory tracts of the trigeminus, heredity in paranoia querulous, and the genetics of mental diseases.

The war sent him into air service in the Austrian army on the Russian front but he was recalled to Vienna for hospital service in cases of brain injuries. It was in this service that he made his greatest contribution, the detection and description of encephalitis lethargica at the outset of the world epidemic of this dread disease. This led to studies of the pathological foci of the disease, the physiology of sleep, and the location and structure of the sleep-regulating center. A great undertaking, started in 1912, on the human cerebral cortex was published in 1925 as *Die Cytoarchitektonik der Grosshirnrinde* designated by critics as a regal contribution to science. He later published works concerning a theory of sleep and progressive cerebration, the latter designed to stimulate investigation of the brains of distinguished persons. Larger opportunities followed in lectures in New York in 1929 and the opening of a new Brain Institute in the Psychiatric Clinic at Vienna in 1931, but death in October, 1931 closed his promising career.

The book contains an appreciation of his personality and scientific work by his colleague, Professor VON WAGNER-JAUREGG and reprints of his three New York lectures.

CHARLES A. KOFOID.

Louis Ginzberg. — *The Legends of the Jews.* Bible Times and Characters. Vol. I : From the Creation to JACOB; XVIII + 424 pages, 1909. Vol. II : From JOSEPH to the Exodus; VII + 375 pages, 1910. Vol. III : From the Exodus to the Death of MOSES; X + 481 pages, 1911. Vol. IV : From JOSHUA to ESTHER; VII + 448 pages, 1913. Vol. V : Notes to volumes I and II ; XI + 446 pages, 1925. Vol. VI : Notes to volumes III and IV; I + 490 pages, 1928. Vol. VII : Index, By BOAZ COHEN; IX + 612 pages, 1938. The Jewish Publication Society of America, Philadelphia. (Price, $ 15).

In the last century various attempts have been made to deal with the topic of the Jewish legends. PROFESSOR GINZBERG's ***magnum opus*** represents the first fundamental work on the subject, and will probably remain so for a century to come. It is comprehensive, we may say exhaustive, in its scope, systematic in its arrangement, and thoroughly scientific in its methods. As regards familiarity with the original sources, philological accuracy and deep critical acumen and ingenuity, there is perhaps no other man alive to compete with him. LOUIS GINZBERG is recognized as the master of his field and as the dean of modern Jewish learning.

At the outset it must be remarked that the author does not propose to deal with all the Jewish legends. As the title indicates, his thesis is limited to the heroes and events of Biblical times, and in this very limitation the master reveals himself. The Bible is the greatest creation of Israel. To civilization of mankind in general, it serves as one of the cornerstones and pillars. But in the life of the Jewish people it came to be the very heart and soul, the center around which everything else clustered and toward which everything else gravitated. It dominated Jewish thought and imagination to such an extent that nothing could gain entrance into the domain of their poetry and literature unless it could be shown to have a root and foundation in the Bible.

Already in Biblical times there was in Israel, as well as among the Arabs, Greeks and so many other races, a class of professional bards and story-tellers who wandered about the country and entertained the people by reciting the songs and sagas of olden times. The *Agadah*, or also *Haggadah*, of Talmud and Midrash is the continuation of the old saga. By that time the old Biblical saga had already been written down and had become the Holy Writ, portions of which were to be recited weekly in the synagogue. The weekly lecture from the Sacred Book became a part of the liturgy, a stereotyped formula which was no more interesting and attractive for the audience. The *Agadist*, combining the preacher and story-teller in one person, brought variety, new life and passion into the monotonous recitations. The sermon, or homily,

gave a new, up-to-date interpretation of the text, and a new, much expanded, embellished and dramatized form of the saga. Each of these religious story-tellers tried to attract the people to his synagogue by telling them a great deal more about their heroes and patriarchs than was written in the Scripture. Each of these homiletic minstrels tried to develop, to enrich, to expand and to embellish the old stories till they became more moving and edifying, more amusing and entertaining. This genre of Hebrew literature is known as the *Agadah*, a combination of saga and homily, a blending of legend and Scripture-interpretation, of *Haggadah* proper and Midrash. It always remained a floating mass of oral traditions, a chaos of scattered bits and fragments. There never was a complete collection, an authoritative edition of the legends, there never was a Canon of the *Haggadah*. Such late and incomplete collections as were made came down to us in the form of Midrashim, emphasizing the homiletic interpretation and neglecting the legendary lore.

As GINZBERG (Preface to vol. I, p. X-XI), properly says : "Jewish legends have rarely been transmitted in their original shape. They have been perpetuated in the form of Midrash... The teachers of the *Haggadah*... were no folklorists, from whom a faithful reproduction of legendary material may be expected. Primarily, they were homilists, who used legends for didactic purposes, and their main object was to establish a close connection between the Scripture and the creations of the popular fancy, to give the latter a firm basis and secure a long term of life for them". One of the main tasks of the present author was, therefore, to undertake a critical separation between the original elements of saga and the later additions of learned homily.

The original sources from which GINZBERG collected his material are of the vastest extent and the greatest variety. Thousands of volumes of the most recondite literary products had to be thoroughly studied in order to gather the widely scattered bits and relics of Jewish saga. In the first place, of course, the works of the Talmudic-Midrashic literature had to be utilized. Extending over a period of more than one thousand years, they contain the major part of the material. A considerable number of legends were culled from the Targumin, the various other Bible translations, and from the later Rabbinic sources, which often preserved genuine old traditions. To the latter class of sources may also be counted the numerous commentaries of the Cabbalists and mystics and the various tracts of the mediaeval poets, scientists and philosophers.

For the benefit of the readers of *Isis* and as a supplement to SARTON's *Introduction to the History of Science* (1,614), I would like to reproduce here in full one significant legend, bearing on the origins of medicine,

which was taken from the first chapter of ASAPH JUDAEUS (7th, 9th or 10th century) (1). The legend reads : (2)

"No sooner had the children of NOAH and their children's children taken possession of the habitations apportioned to them (after the recession of the Flood), than the unclean spirits began to seduce men and torment them with pain and all sorts of suffering leading to spiritual and physical death. Upon the entreaties of NOAH God sent down the angel RAPHAEL, who banished nine-tenths of the unclean spirits from the earth, leaving but one-tenth for MASTEMA, to punish sinners through them. RAPHAEL, supported by the chief of the unclean spirits, at that time revealed to NOAH all the remedies residing in plants, that he might resort to them at need. NOAH recorded them in a book, which he transmitted to his son SHEM. This is the source to which go back all the medical books whence the wise men of India, Aram, Macedonia, and Egypt draw their knowledge. The sages of India devoted themselves particularly to the study of curative trees and spices; the Arameans were well versed in the knowledge of the properties of grains and seeds, and they translated the old medical books into their language. The wise men of Macedonia were the first to apply medical knowledge practically, while the Egyptians sought to effect cures by means of magic arts and by means of astrology, and they taught the Midrash of the Chaldees, composed by KANGAR, the son of UR, the son of KESED. Medical skill spread further and further until the time of AESCULAPIUS. This Macedonian sage, accompanied by forty learned magicians, journeyed from country to country, until they came to the land beyond India, in the direction of Paradise. They hoped there to find some wood of the tree of life, and thus spread their fame abroad over the whole world. Their hope was frustrated. When they arrived at the spot, they found healing trees and wood of the tree of life, but when they were in the act of stretching forth their hands to gather what they desired, lightning darted out of the ever turning sword, smote them to the ground, and they were all burnt. With them disappeared all knowledge of medicine, and it did not revive until the time of the first ARTAXERXES, under the Macedonian sage HIPPOCRATES, DIOSCORIDES of Baala, GALEN of Caphtor, and the Hebrew ASAPH.

Here again we have before us a blending of old legendary lore and some genuine historical reminiscences on the origin and the spread of medicine.

Frequently GINZBERG was able to avail himself of material preserved in manuscript copies only. Almost all the printed sources were used by the author in the best critical editions, when available, or in the rare first editions. In his arduous desire to reproduce all the Jewish legends "with the greatest attainable completeness and accuracy", the indefatigable author did not restrict himself to Jewish sources alone. The rich literature of the Church, the Apocrypha and Pseudepigrapha, were thoroughly searched for every bit of Jewish legendary lore to be found

(1) See SARTON, *Introduction*, I, 614; *Encyclopaedia Judaica*, III, 538. The article on ASAPH in the *Jewish Encyclopaedia*, II, was written by LOUIS GINZBERG.

(2) See *Legends of the Jews*, I,173-4; V, 196; VI, 369, note 90.

there. The Pseudepigrapha in particular are considered by GINZBERG as being of fundamental value for the compilation of the Jewish saga. "Besides the Greek writings of the Hellenist Jews, they contain Latin, Syrian, Ethiopic, Aramean, Arabic, Persian, and Old Slavic products translated directly or indirectly from Jewish works of Palestinian or Hellenistic origin. The use of these Pseudepigrapha requires great caution. Nearly all of them are embellished with Christian interpolations, and in some cases the inserted portions have choked the original form so completely that it is impossible to determine at first sight whether a Jewish or a Christian legend is under consideration". The author, however, is confident that the material levied by him from these sources is Jewish beyond cavil. In addition to that the vast and obscure literature of the Church Fathers has been thoroughly investigated for the relics and vestiges of Jewish legend which they have preserved, and the harvest brought home by the author is very rich indeed. For this particular work GINZBERG was eminently prepared, as already his Doctor's dissertation, which appeared forty years ago (in 1899), dealt with the *Haggadah* in the writings of the Church Fathers, and since that time he has published numerous monographs on the subject.

Having collected all this vast material GINZBERG was confronted with the difficult task of bringing order and unity into the often conflicting versions of one and the same legend in the various sources. The limited space at his disposal did not permit him to give a verbal rendering of all the variants. Hence the fundamental component parts of each story were fused into a typical legend, so that the text, given in the first four volumes, presents a smooth, harmonious narrative which even the layman can enjoy as a pleasant reading matter. The learned notes with references to the sources and critical interpretations were relegated to volumes V and VI. These notes often assume the size and importance of excursuses and monographs and are intended for the scholar only.

The value of the work is greatly enhanced by the elaborate Index, filling the whole of vol. VII, which has just appeared. This is not the usual Index mechanically prepared by a clerk in the publisher's office. It is a scholarly performance, almost on the scale of a concordance, compiled by Dr. BOAZ COHEN, a Talmudic scholar of repute and an eminent bibliographer. The work of the Index was done by him with great industry and accuracy, out of love for the subject and out of devotion to the author whom he reveres as his teacher and guide.

GINZBERG's *Legends of the Jews* represents the most complete collection of the Jewish saga, the final Canon of the *Haggadah*. It is destined to become a classic in Jewish lore and learning. In its importance and authoritative character it may be compared to the legal code of MAIMONIDES

(1135-1204). In the latter work, famous as the *Mishneh Torah*, *Yad*, or also *RaMBaM*, MAIMONIDES collected the extensive material of the widely scattered *Halakah*, the civil and religious law of the Jews, and organized the chaotic mass of conflicting traditions, contradictory opinions and obscure, enigmatical discussions into a clear and harmonious system of law. The architectonic harmony, the unique power and beauty of this legal skyscraper was so fascinating, that even the zealots of his time readily forgave the author his flirtations with "the strange Greek woman", his aspirations to become the philosophical "Guide of the Perplexed", and hailed him as their religious leader, as the second MOSES. The phrase was coined about him : "From MOSES till MOSES none arose like MOSES". Popularly, he was referred to as the RaMBaM, a word consisting of the initials of RABBI MOSES BEN MAIMON, and conveying the notion of an intellectual giant and wizard. The same cognomen was also applied to his *magnum opus*. In a sense, LOUIS GINZBERG, and his work, may be called the modern RaMBaM of the *Haggadah*. If the reviewer may betray a secret, he would like to disclose that for the last twenty years Professor GINZBERG was busy with the preparation of a comprehensive work on the history and critique of the Jewish law, which may yet become an historical RaMBaM of the *Halakah*. Rumours are rife that our author, too, is not insusceptible to the charms and spells of "the strange Greek woman". Will he perhaps rise to become the "Guide of the Perplexed" of his race and time? None can tell. However, it seems that the perplexed of our time do not look for guidance to the scholars and philosophers. They dance to the tunes of the circus clown with the horse-whip.

New York City. SOLOMON GANDZ.

Liao Wen-jen.—*Tôyô kakke-byô kenkyû.* (Historical study of the beri-beri in the Orient). 428 pp. portrait. Kyoto, Kaniya, 1936. (Y. 5.00).

Dr. LIAO has studied the beri-beri from the historical and geographical viewpoints. Beri-beri was known in China before the Christian era and occurred periodically in south China. It is first mentioned in Japan in the 13th century and was known as an ailment of city dwellers. GYÛZAN KAGETSU wrote : "Officials and merchants who go to the eastern capital often are subjected to this malady which makes their knees wabbly, face and limbs swollen, and appetite completely gone. It is known as the Edo Malady. When they start going home and cross over the Hakone pass, they usually get well". Damp and polluted city air, and change in diet and water, and lack of adequate exercise were considered its

cause. In the 19th century there were four epidemics of beri-beri and both the city and country dwellers were its victims.

In spite of its being prevalent in Japan and China, the cases of beri-beri are rarely found in Korea, but according to a report published by the Beri-beri Investigation Committee, among the Koreans brought over to Japan to engage in railroad construction, more than 8.5 % were afflicted with the disease. According to F. GRIMM, the Ainu race in Hokkaido are less susceptible to it than the Japanese. During the Russo-Japanese war, a large percentage of Japanese soldiers suffered from it, but of 59,517 Russian prisoners, there were only 22 who had it. Yet CARL LOVELACE maintains that there is no racial immunity.

Dr. LIAO combes through the Chinese and Japanese records and traces its history, nomenclature, and gives all the available statistical reports.

Old treatises attribute the cause of beri-beri to external matters such as the foul vapour of the earth, the poison fermented by mutation, or polluted water. In the 17th century the Chinese physicians claimed that it was brought about by syphilis, venereal diseases and excessive drinking. It was Dr. GENKEN TAKI who first stated that beri-beri was caused primarily by the lack of an unknown necessary substance in food and lack of proper nourishment. Although he and others urged beri-beri patients to refrain from eating polished rice, it was a long time before they discovered that rice as chief diet was one of the main causes of the disease. The Japanese scholars, however, found a few years previous to the discovery of vitamins that for the treatment of beri-beri, bread, unpolished rice, and red beans are important. Dr. TSUZUKI's "Anti Beri-berin" is an extract from rice-bran.

Each chapter is followed by an extensive bibliography.

S. S.

Kinnosuke Ogura.—*Nihon sugaku no tokushu-sei* (Unique features of Japanese mathematics) *Chuo Koron*. v. 53, no. 1; Jan. 1938. pp. 31-47. illus.

Mathematics as science in Japan dates back only to the early 17th century. Scholars in Kyoto and Osaka studied the Sung and Yüan mathematics in China and began to apply some of the principles to practical use. The *Jingô-ki* (1627) was the first mathematical treatise in Japan. The prohibition of Christianity in 1630 soon led to the prohibition of scientific treatises translated into Chinese by MATTEO RICCI and other Jesuit missionaries, thus making the Western science inaccessible to the Japanese scholars. Nevertheless, KAZUTAKA SEKI (1642?-1708) in Edo with his pupils worked out various complicated

problems of algebra, geometry, and calculas with the abacus. After 1726 with the more lenient policy of the Shogunate, the Western scientific treatises in Chinese were imported, and such scholars as CHOKUEN USUJIMA (1733-1800) and SADAMOTO FUJITA (1734-1807) simplified the native technique of calculation and revised the calendar system, surveying, and astronomical studies.

The Japanese under the feudal regime failed to recognize mathematics as science. Like the art of chess or fencing, therefore, a few masters taught it, guarding their methods in absolute secrecy. Pupils of one master were not allowed to associate with those of other schools. There were, however, two methods of publishing the results of their research. The first was by circulating either in manuscript or in print problems they had worked out, but without the solution. The second is in the form of votive tablets. Famous masters would work out their complicated problems and offer them to the temples and shrines and hang them in a place where they would attract public attention. For such exhibition, the masters not only made the tablets attractive with illustrations and drawings, but also the problems themselves became complicated and fantastic. Each master tried to outwit the other.

The Japanese mathematicians were not interested in theory; they were not at all concerned with any abstract concepts. Neither were they interested in method. Mathematics in their hands became a game and art. An anonymous author of the *Sanwa zuihitsu* in 1811, wrote: "As to the intricacy and fancy, there is nothing like the native mathematics." With the introduction of the Western mathematics, the native science disappeared in a very short time.

S. S.

Kinnosuke Ogura.—*Hôken sûgaku no metsubô* (Decline of the Japanese native mathematics of the feudal period) *Kaizo*, v. 20, no. 1; Jan. 1938. pp. 107-121, illus.

Though brilliant and original, the Japanese mathematical studies with no practical value and complicated system could not compete with the Western science. With the introduction of commerce and industry, the government recognized the importance of new mathematical studies and appointed a Dutch linguist in 1855 to teach mathematics and navigation. In 1863 a new Bureau of Mathematics was established. In the following year, KÔHEI KANDA, a student of Dutch, was made to teach it in the military school. With the compulsory education system, the Department of Education in 1872 prohibited the teaching of the native method in schools and ordered the new Western mathematics to be taught, but there were not enough trained teachers and for a few years

they had to go back to the native method. In 1877 a mathematical society under the name of the Tokyo Mathematical Company was organized, and began to publish a journal. Though the Company was made up of scholars of the old and new schools, its journal contained mainly articles of the scholars of Western mathematics. The Tokyo University in 1884 had for the first time a few students who majored in mathematics.

Since those pioneers who taught the new Western science were not specialists, they failed to understand either the limitation of Japanese, or the significance of the Western, mathematics. Since the old-fashioned scholars were so convinced of the superiority of the native study, they made no effort to look into the new. An enthusiastic author wrote in 1863 : " Western mathematics can be mastered in a day. There is no waste of time or effort. While sailing a boat, riding on horseback, or walking, with a pencil and piece of paper, difficult problems can be solved in no time." Today except for the use of the abacus for simple problems of arithmetic, the native science of calculation is forgotten.

SHIO SAKANISHI.

Kensaburo Ogawa.—*Nihon ganka-gaku shôshi.* (A brief history of ophthalmology in Japan) 237 pp., plates, illus. Tokyo, Toô-dô, 1904. (Y. 1.10).

The earliest Japanese records make no mention of ophthalmology or any specific form of eye diseases, but a neolithic clay figure with eye shades was discovered in Mutsu Province. With the introduction of Chinese medicine through Korea in the 5th century, the Imperial court established an office of physicians. In the reign of Emperor SUIKO (593-628), two students were sent to the T'ang court to study medicine. Under the edicts of TAIHO (701) the Bureau of Medicine consisted of four departments : internal medicine, pediatrics, surgery, and eye, ear, and dentistry. Students in the first department were required to study seven years; the second and third groups, five years, while the last only four years. Soon more advanced study of eye diseases commenced under the Chinese who migrated from their native land.

The Majima school of ophthalmology was organized by Priest SEIGAN (*d.* 1379), but they kept their methods of treatment in absolute secrecy till 1558 when MAJIMA DAICHIBÔ wrote a treatise entitled *Majima-ryû ganmoku hidensho* (Secret document of the Majima school of ophthalmology). According to the treatise, the Chinese attributed all eye ailment to external causes, but fairly early in their study, the Japanese knew such trouble as cataract was caused by internal disturbance. The five organs of the body were related to the five parts of the eye. For example

the trouble of the white of an eye was attributed to disease of lungs, while that of pupils to kidney trouble. There were seventy-two diseases of the eye, and beside eye-lotions of all kinds and varieties, they had pills and liquid medicine to be taken internally. Sometimes moxa-burning was tried.

In 1556 a Jesuit missionary came to Bungo Province and practised Western medicine, but had little influence on Japanese science. In 1754 YAMAWAKI TÔYÔ (1705-1762) succeeded in obtaining permission to perform an autopsy, and with the translations of a Dutch treatise on anatomy in 1771 by SUGITA GENPAKU (1733-1817) and of an ophthalmological treatise (*Doctrina de morbis oculorum*) (1) of JOSEPH JAKOB PLENCK by UDAGAWA GENSHIN (1769-1834) some time later, this branch of medical science was revolutionized. The coming of PHILIPP FRANZ VON SIEBOLD (1796-1866) to Japan in 1823 provided another impetus. Within a few years there were published over twenty treatises on ophthalmology.

The remaining part of the book is devoted to the summary of the introduction of Western ophthalmology in Japan.

SHIO SAKANISHI.

R. Hoenigswald.—*Denker der italienischen Renaissance. Gestalten und Probleme.* Basel, Verlag Haus zum Falken. 1938. 248 pp. (Schw. Fr. 10.-)

The philosophy of the Italian Renaissance is a somewhat neglected field in the History of Philosophy and Science. Figures such as CARDANO, FRACASTOR, CAESALPINO, ZABARELLA, CREMONINO etc. and their concepts are, as a rule, not taken seriously. Interest in them is aroused by curiosity or they may serve as a background in studies on Renaissance culture or art. There are only a few modern philosophical works which have given the Renaissance philosophers serious attention. Those by ERNEST CASSIRER and the studies by ERNEST HOFFMANN and RAYMOND KLIBANSKY in connection with the new appreciation of NICOLAUS CUSANUS may be particularly mentioned because of the many points of interest they offer to Historians of Science, and because here attempts at outlining a definite character and line of development in Renaissance philosophy will be found. The Historian of Science feels a definite demand for a book which, based on the knowledge of the original sources gives a scientific account of the tendencies, of the "figures and problems" of the philosophy of the Italian Renaissance. He will therefore welcome

(1) JOSEPH JACOB VON PLENCK (1733-1807) was a Viennese physician, author of a great many medical books. His *Doctrina de morbis oculorum* was first printed in Vienna 1777 and soon translated into Italian and German (BL 4, 631-32, 1932).

the present book by HOENIGSWALD. The author, well known as one of the foremost exponents of modern German philosophy and philosophical psychology, is an expert in the field of Renaissance philosophy on which subject he has contributed some valuable monographs, e.g., one about GIORDANO BRUNO. His aim is to introduce the reader to the chief problems of the Renaissance philosophy by a series of short critical essays which draw vivid pictures of the main philosophers of the Italian Renaissance. They give the type of man and his philosophy in a very concise and condensed manner so that the reader needs to study every sentence and passage seriously. Yet, whoever takes the necessary care in studying this book with close attention will feel most grateful to the author; he will realize that it gives much more than a deep account of the figures and problems. It shows in a most convincing way that these Renaissance thinkers, many of whom are almost derided or hardly known to the modern philosopher or scientist, form important landmarks in the development of *modern* philosophy and science. The chapters of the book include sketches of the Neoplatonists : PLETHON, FICINO, GIOVANNI and GIOVANNI FRANCESCO PICO DELLA MIRANDOLA, NIZOLIUS, VALLA; the Italian Aristotelian school follows with : POMPONAZZI, CAESALPINO, ZABARELLA, CREMONINO, FRACASTOR, CARDANO, TELESIO; finally accounts of CAMPANELLA, BRUNO, LEONARDO DA VINCI and GALILEO are given. With a chapter on "the problems of the philosophical Renaissance" the book concludes. Among the essays those on PICO, CAESALPINO, CARDANO, TELESIO, PATRIZZI, CAMPANELLA, LEONARDO and GALILEO attract special attention. All these philosophers try to fulfil the platonic task of "saving" the phenomena from the realm of chance by detecting the laws in nature. PICO's opposition to astrological and magic symbolism is deeply connected with his yearning for the establishment of the special conditions underlying each phenomenon. In CAESALPINO the Aristotelian bias is obvious — yet his notion of the "Essential" has lost much of its scholastic and formal logic character and corresponds to that of "Law in Nature", as seen for example in the natural system of the plants. ZABARELLA is deeply concerned with the essence and purpose of logic, which in his conceptions becomes more and more methodology and epistemology thereby superseding its position in the Aristotelian philosophy and approaching certain tendencies of Kant. FRACASTOR's philosophy is based on the problem of the "A priori". Even CARDANO's "magia naturalis", definitely a precursor of science, emerges as a fruitful methodological idea. It paves the way for the notion of unity and totality of nature which is expressed by sympathy and antipathy in all objects and processes. In fact, CARDANO's doctrine embraces the laws in nature to which even

God is subjected. The doctrine of sensual experience culminates in TELESIO's and CAMPANELLA's philosophy as explanation of nature "iuxta propria principia" and in an anticipation of DESCARTES' "Cogito ergo sum". As yet, there is no science in the proper sense; there are scientific tendencies; there is no critical philosophy, there are only attempts at establishing philosophical principles behind the phenomena. GIORDANO BRUNO unconsciously returns to the old Aristotelian philosophy to which he seems to be so definitely opposed. The aesthetical conception of "Harmony" in nature to which he adheres, leads him to regard classification as the source of perfect knowledge. Science is seen in the perspective of biology. A natural process consists of adaptation of "matter" to a "form" such as an Aristotelian species. BRUNO is a mediaeval and in this sense an Aristotelian thinker. This is his real tragedy.

It is obvious that the concepts of the Renaissance philosophers are the result of manifold and incoherent scientific or religious moods rather than of scientific research or critical philosophical enquiries. Yet — not only do they form the background for the establishment of epistemology and science in Italy, but are, though slightly changed, directly developed into doctrines and views of vital importance in modern philosophy and science.

LEONARDO's position is unique in that he is by no means a theoretical philosopher or scientist in the strict sense. Yet, as an artist he has to do all the scientific work he needed himself at a time when the men of learning were occupied by classical studies, and the philosophical insight of the "Uomo Universale" into the principles of epistemology leads him to concepts which are similar to that of LEIBNIZ' "Observabilité", in their significance for the concept of certainty in scientific knowledge.

With GALILEO Renaissance philosophy has definitely laid the foundation of methodical science, since his scientific discoveries are but illustrations of his philosophical and epistemological attainment : the establishment of the law in nature. His results are not abstractions from a number of individual cases, but laws determining the event in every individual case, provided identity of the conditions. The individual law, however, is but one member in the universal system of laws in nature, i.e. wherever an individual phenomenon or law is discussed, this system of laws and the position of the individual law in it are taken into consideration. Nature is therefore a well determined system in which everything has its position according to certain principles — rather than the Aristotelian sum of individual entities ("substantial forms" or "natures") which exist side by side. In the author's opinion, GALILEO's experiment has therefore nothing to do with "mera experientia", with a simple trial, it rather serves to illustrate and represent the idea of a system of nature based on mathe-

matical principles. This is combined with a reformation of the old scholastic logic which is now not mere formal consistency, but scientific methodology, "inventio". The type of logic consistency changes according to the problem in question. Consistency excludes ambiguity, and "analysis" is GALILEO's method to attain this by means of mathematics in certain problems of physics. Logic therefore no longer exists side by side with science, but is an essential part of the latter. By this foundation of science the old doctrine of "two-fold truth" becomes obsolete, religious truth is definitely separated from the scientific one, the former exists "fide" and in no way interferes with the scientific "ragioni". HOENIGSWALD finds in GALILEO's epistemology traces of genuine Platonism and in this respect GALILEO appears to be a true exponent of Renaissance philosophy. Every sensible human being possesses the certainty in knowledge, derived from its ultimate source : the Platonic "Anamnesis". This certainty, however, does not exist *because* everybody possesses it : on the contrary, everybody possesses it, *because* it is established in itself as the cornerstone of true knowledge, of reality. GALILEO's world is definitely separated from the mediaeval one, but not because he embarked on experimental science. The experiment as such was enthusiastically recommended in mediaeval times. But there was no idea of the relationship between experiment and "analysis", of the concept that the experiment represents the conditions and thus the "necessitd" of a phenomenon. The gap between mediaeval and GALILEO's thinking remains even if some of GALILEO's *results* seem to have been anticipated by mediaeval scholars. The historical problem is therefore not the question as to how far the relationship between acceleration and time of falling bodies was known to the Middle Ages and how far mediaeval scientists tried to prove this by experiments on an inclined plane. The question is whether this knowledge had been developed by pursuing a method which was the expression of something quite different from mere empirical experience. On the other hand the debate as to the continuation of mediaeval thinking in Renaissance philosophy is in HOENIGSWALD's opinion a question of terminology. Who does not recognize the mediaeval motives and germs in Renaissance philosophy, will not be able to see the orbit of new tasks and problems peculiar to the latter. There is no doubt that Renaissance philosophy is a well defined period in itself, which substitutes the new mathematical epistemology and methodology for the mediaeval philosophy of "universalia" which took the reality of such things for granted. Apart from the methodological bias there is the specific relationship between Renaissance philosophy and history which gives the former a special character, in that the Renaissance thinkers quite consciously try to revive

ancient tendencies and to reconcile them with the problems of a new active present and future. The period creates the great "personality", and the Renaissance idea of it may be regarded as a synthesis of the Christian concept of man as a child of God and of the Stoic ideas of a universal human community.

Space does not permit more than a rough survey of HOENIGSWALD's views. We have before us a chapter of the History of Philosophy and not of Science. Thus, it is only natural that the philosopher HOENIGSWALD points out the epistemological achievements of the thinkers and pays only occasional attention to their scientific attainments. This is bound to result sometimes in slightly one-sided pictures. The relationship between GALILEO and the mediaeval scholars might be interpreted in a way different from that outlined above. One may find justification in regarding GALILEO as an exponent of empirical research and opponent to any metaphysical idea, yet on the other hand his reasoning might even be compared with that of scholastic thinkers. Valuations of this kind must always be open to criticism. In Renaissance philosophy a yearning for pure empiricism derived from religious and non religious scepticism is sometimes prevalent and its discussion in detail would be gratifying for the Historian of Science. The hope may be expressed that a second edition will soon follow in which the space may be increased, so as to allow an easily readible language instead of the condensed and concentrated, though very deep and subtle presentation of the subject in the first one. The second edition might also contain a most valuable gift to the reader : full references and a literary apparatus.

There is no doubt that the author has written an excellent book on which he must be congratulated. Everybody who is interested in the History of Philosophy, Science, Medicine and Human Culture will benefit by it immensely.

Cambridge, England. WALTER PAGEL.

Vilhjalmur Stefansson.—*Adventures in error.* VIII+299 pp. New York, MCBRIDE, 1936.

I would like to call the attention of our readers to this volume because of its great methodological value. The burden of it is to illustrate the persistence of error and its cultivation not only by ignorant people but by many others who ought to know better. The explanation is laziness and inertia, as well as the love of standardized stories. Most of the stories discussed relate to arctic conditions which the author knows so well, and about which false facts or false deductions continue to

FIGURE
DE LA BÊTE
FAROUCHE

ET EXTRAORDINAIRE, QUI DÉVORE LES FILLES

Dans la Province de Gévaudan, & qui s'échappe avec tant de viteſſe, qu'en très-peu de tems on la voit à deux ou trois lieues de diſtance, & qu'on ne peut l'attraper ni la tuer.

EXPLICATION.

ON écrit de Marvejols, dans la Province de Gevaudan, par une Lettre en date du premier Novembre mil ſept cent ſoixante-quatre ; que depuis deux mois il paroît aux environs de Langogne, & de la Forêt de Mercoire une Bête farouche qui répand la conſternation dans toutes les Campagnes. Elle a déja dévoré une vingtaine de Perſonnes ſur-tout des Enfans & particuliérement des Filles. Il n'y a guére de jours qui ne ſoient marqués par quelques nouveaux déſaſtres. La frayeur qu'elle inſpire empêche les Bucherons d'aller dans les Forêts, ce qui rend le bois fort rare & fort cher.

Ce n'eſt que depuis huit jours qu'on a pu parvenir à voir de près cet Animal redoutable. Il eſt beaucoup plus haut qu'un Loup : il eſt bas du devant, & ſes pattes ſont armées de griffes. Il a le poil rougeâtre ; la tête fort groſſe, longue, & finiſſant en muſeau de Lévrier ; les oreilles petites, droites comme des cornes ; le poitrail large & un peu gris ; le dos noir, noir de une gueule énorme ; deux rangs de dents très-tranchantes, qui lui ſéparé pluſieurs têtes du corps, comme pourroit le faire un razoir. Il a le pas aſſez lent, & il court en bondiſſant. Il eſt d'une agilité & d'une viteſſe extrêmes : dans un intervalle de tems fort court on le voit à deux ou trois lieues de diſtance. Il ſe dreſſe ſur ſes pieds de derriere, & s'élance ſur ſa proie, qu'il attaque toujours au cou, par derriere, ou par le côté. Il craint les Bœufs, qui le mettent en fuite. L'allarme eſt univerſelle dans ce Canton ; on vient de faire des Priéres publiques ; on a raſſemblé quatre cens Payſans pour donner la chaſſe à cet Animal féroce, mais on n'a pu encore l'atteindre.

Vû par moi Cenſeur pour la Police.
Vû l'Approbation, permis d'Imprimer à la charge d'en régiſtrer à la Chambre Syndicale. Ce 22 Novembre 1764. DE SARTINE.
Regiſtré ſur le Régiſtre N°. 16. de la Communauté des Libraires & Imprimeurs, page 197.

Se vend AUX ASSOCIÉS. Chez F. G. DESCHAMPS, Libraire, rue Saint-Jacques.

flourish in spite of the explorers' efforts to correct them. I can readily sympathize with the author's anger because the situation is very much the same in my own field, with the same aggravating circumstances, that is, after certain facts have been proved by competent observers to be erroneous they are nevertheless reintroduced by distinguished men, using the authority legitimately obtained in other fields in order to revive discredited views.

Among the facts dealt with are meteorological conditions in the arctic and arctic climate, the ostrich's habit of hiding its head when frightened, the wolves' habit of attacking human beings in packs, the geographical distribution of the Eskimos and their " universal " use of houses made of ice and snow, their hunting methods, their fondness for drinking oil, the Eskimo manner of carrying babies, the feeding and migrations of the musk oxen, etc. With regard to wolves and legends concerning them, the author would find pleasure in reading the book of FRANÇOIS FABRE: *La bête du Gévaudan* (Paris, 1930; *Isis* 17, 518), perhaps the greatest wolf story that was ever allowed to grow and to be taken at its face value by a whole population, poor or rich, ignorant or learned. The beast of the Gévaudan was a fantastic animal which caused c. 1764 a real panic not only in that country (dép. Lozère) but all over France. I reproduce one of the early prints (1764) relative to it among many others included in FABRE's delightful account.

One of the chapters of STEFANSSON's book is devoted to a savage criticism of a number of Canadian geographical textbooks, wherein many of the classical errors (detrimental to Canada) were carelessly repeated. I will ask students in my seminar to read this book, discuss the author's illustrations and find new ones. This will be as good an exercise in criticism as could be devised; it will help them to be always on their guard and never to accept too readily a statement, even when supported by eminent authorities. Authorities, it should be remembered, are authorities only in their own field and even then it is just as well to examine their credentials and to make sure that any particular statement of theirs is deliberate.

The last chapter of the book deals with the " history of the bathtub in America", a hoax perpetrated by H. L. MENCKEN in 1917, which deceived many people at that time and will continue to deceive many more in the future. This is also very instructive.

This book would have pleased me even more if it had been less flippant and sarcastic, but we should be grateful to the author for having written it, even as it is, for no intelligent man will read it without being a little wiser for it.

GEORGE SARTON.

Martin Gumpert.—*Trail-blazers of science.* Life stories of some half-forgotten pioneers of modern research. Translated from the German by EDWIN L. SHUMAN. x + 306 p. New York and London: FUNK & WAGNALLS Company, 1936. Price $ 2.50.

The author's selections of pioneers of science include CARDAN, VESALIUS, SERVETUS, SWAMMERDAM, KASPAR FRIEDRICH WOLFF, LAMARCK, JULIUS ROBERT MAYER, JACKSON and MORTON, and PETTENKOFER. A closing chapter is devoted to a type of the future scientist, HARVEY CUSHING, the brain surgeon. About each of these eminent names the writer entwines the stories of contemporaries, forerunners, and followers, but above all, of antagonists. He deplores the current day psychologizing which exaggerates the traits of inferiority in training and deportment of great men with resultant distortion of their characters and the obscuration of the significance of their accomplishments. However, he dramatizes these human documents by the use of some of the very psychoanalytical processes which he seemingly deplores. The underlying theme is the " ineradicable opposition to genius," which has marred the story of discovery, and, though the author does not suggest it, may even have been a potent incentive to the elaboration and clarification of the discoverers' themes.

The author has been lax in checking up some of his statements and sometimes puts forth sweeping conclusions without adequate support. For example, he says (p. 123) that LEEUWENHOEK " left behind him 419 microscopes, which are now in the British Museum." The fact is that he sent 26 to the Royal Society which cannot now he found and according to DOBELL (ANTONY VAN LEEUWENHOEK and his " little animals," New York, 1932, p. 314) they are not nor have they ever been in the British Museum. On page 137 he writes that " German science was the last cultural element to be restored " with the reentrance of Germany into European civilization after the Thirty Years' War. The linkage of science with letters, music, philosophy, medicine, and other efflorescences of the human spirit is, it seems, closer than this chronology indicates. On page 140 he states that " the story of evolution begins with Aristotle " and illustrates this by citing embryonic development and a statement that ARISTOTLE discovered that *the* shark produces a placenta whereas it is only a certain shark.

On page 144 he speaks of the work of SWAMMERDAM, HARVEY, and WOLFF as having opened the way " for an organized life system, an inner unity of all living things. From these revolutionary biological discoveries a straight road leads to the social and political revolutions of mankind." It is very doubtful that any sense of direction indicating an intellectual highroad or that adequate evidence of an inner unity

of all living things can be established in the writings of these pioneers. The author adumbrates their work with the light of later years and points out only one of many roads some of which are much better travelled into the arena of revolutions.

He is perhaps nearer the truth when he avers that " biology as a social science " traces its beginning back to LAMARCK. The Russian revolution has utilized the environmental factor in human evolution to the full as justification for its social program but this is hardly proof for the soundness of LAMARCK's factors of direct action of environment or the inheritance of acquired characters or for the charge (p. 170) that the excesses of Darwinism " made a great deal of trouble for serious natural science." He does justly award to LAMARCK the honor of presenting the ideas of inconstancy of species, an ascending scale of being, and a theory of evolutionary descent, all too often minimized in the light of DARWIN's more fully substantiated and supplemented concept of organic evolution.

This is a very readable book—with the salt cellar at hand and a challenging intent.

CHARLES A. KOFOID.

A. Cornelius Benjamin.—*The Logical Structure of Science.* 344 p. Psyche Monographs, no. 9. KEGAN PAUL, TRENCH, TRUBNER, and Co., London, 1936. (Price 10/6 d).

This volume takes for its theme the problem of investigating the " outstanding issue in the history of the philosophy of science ", which, in the author's view, is that " between the positivists and the antipositivists ".

Although many characteristics of the problem are discussed, the volume contains no single, simple statement, precisely formulated in symbolic language, which summarizes the postulates of positivism. It is perhaps easiest, therefore, for one familiar with the history of philosophy and with modern controversies to obtain a summary of the issues debated from the author's classification of the proponents of the two schools. Thus he would place COMTE, MILL, SPENCER, AVERARIUS, MACH, POINCARÉ, PEARSON, and HOBSON in the camp of the positivists; and he would name HAECKEL, BÜCHNER, BERGSON, EDDINGTON, and JEANS as their opponents. " Recently," says the author, " positivism has received new blood from the so-called Vienna group (CARNAP, SCHLICK, WITTGENSTEIN) and from BRIDGMAN and the pragmatists in this country. At the same time anti-positivism has received stimulation from a somewhat more miscellaneous group containing MEYERSON, BAVINK, WHITEHEAD, and PLANCK... But as if this were not enough,

there has arisen still another group (RUSSELL, BROAD, G. E. MOORE, STACE, and many of the American new, and critical realists) who do not attack positivism and thus seem to ally themselves with this position but who call themselves realists upon the grounds of 'construction' and thus seem to employ the method which is essentially that of positivism."

The author expresses an inability to characterize his own position, but he is inclined to favor the positivistic philosophy. "I shall take the liberty," he says, "of calling the position which I am going to defend in the following pages 'critical positivism'." This uncertainty in a measure characterizes the book and makes it a kind of adventure in thinking, where the paths are obscure and the goal to be attained uncertain. The author admits that "many of the solutions here offered are still highly conjectural in my own mind" and his apology for presenting them before he has discovered "what they mean or whether they are true" is that some precision has been attained in formulating the problem and that criticism may be aroused by his attempt at a solution.

Unfortunately either the uncertainties of philosophical speculation do not yield readily to precise symbolic formulation, or else the philosophers are themselves reluctant to employ such arguments. Even with the model of modern symbolic logic before them, they are unwilling, except for notable exceptions, to employ these powerful aids to reason and argument. Thus, it was not until the problems of the continuum were put into a rigid frame of precise definition and until carefully defined symbols were created for terms and operations, that any decided victory was won over the old paradoxes of ZENO. The famous aphorism of BERTRAND RUSSELL: "mathematics is the science in which we never know what we are talking about, nor whether what we say is true" conveys something of a false impression. Mathematical argument begins with postulates and ends with deductions, but there is never any doubt between the two extremes as to what paths are used or what goal is being sought. The obscurity at the beginning, which covers the undefined elements of the discourse, and the fog at the end, which envelopes the nature of absolute truth, do not hinder one in following the path between the two realms. Without such symbolic formulation and such precise statement of postulates, the argument always remains murky.

The present volume is no exception in spite of the author's clarity of style and his unusual facility with words. A penumbra of uncertainty still envelopes many of the terms which he employs. A very interesting example of this is taken from the text, where the author says: "When we look about for a term by which to designate the entity which may be

said to be the basic subject-matter of science, we find many candidates : event, continuant, object, substance, sense-datum, particular. The term which I have chosen is ' occurrent.' Occurrents make up the stuff of nature." One cannot help but think of Humpty Dumpty's famous remark : " When I use a word, it means just what I choose it to mean — neither more nor less... The question is, which is to be the master — that's all." But the reader must not be left with the impression that there is not some defense. If the reviewer has read aright, it is the undiscovered regions at the beginning and the end of logic that are the principal concern of the author. These regions have been peculiarly unattainable by the methods of logic, as one may see from the antinomies and paradoxes that have arisen in the various journeys of exploration.

The book itself is divided into fourteen chapters with titles as follows : 1) The place of science; 2) The structure of science; 3) Nature : occurrents; 4) Nature : complexes; 5) Awareness; 6) Operations; 7) Meaning; 8) Meaning : correlation symbols; 9) Meaning : constructs and hypotheses; 10) The development of knowledge; 11) Models; 12) Description; 13) Explanation; 14) Quantitative methods.

The discussion begins with an attempt to define science and to reduce it to categories. The author is correct in affirming that " by and large, science is not understood in any satisfactory or final sense." The reason for this he states later in the book : " Science is avowedly empirical in its aim and intent, and its task is that of devising a system of symbols representative of the structure and content of the realm of nature. Hence the logical character of its doctrines will be a reflection of the metaphysical character of its subject-matter."

The author has probably undertaken an unprofitable task, or at least a controversial one, when he attempts to form a table of the sciences. The penetration of one science within the boundaries of another, the intrusion, for example, of physics into chemistry, and chemistry into biology, the thread of mathematics which connects the isomorphisms of one discipline with those of another, seem to make classification, if not impossible, at least of doubtful value. Observation shows that all such attempts from COMTE to S. C. PEIRCE have apparently been sterile. The author, however, essays the task again and this taxonomic method runs as a thread throughout the book. It is a significant criticism, however, that he finds no explicit place in his table for psychology " since there are... as many subdivisions of psychology as there are distinct kinds of humanistic science."

The abstract formulations which abound are well illustrated by the following definitions taken more or less at random : Philosophy as it refers to science in general is " the study of the categories implicit in

the sciences." Philosophy as it refers to special disciplines is " the study of the categories explicit in the sciences." Science itself appears to be " an awareness of something, which is numerically and qualitatively other than the awareness, and which is related to the awareness in a way which we describe by saying that the awareness is *of* it." " An operation may be defined as an act by which awareness passes from one content to another." " The nature of meaning is a product of the nature of the occurrent from which it has been derived and the nature of the operation by which it has been derived." But in all of these we find that understanding has been thrust back upon other words as category, awareness, occurrent, content, product, etc. These in turn depend upon other words and the fatal chain is without end. The problem of language, old as the *lingua characteristica* dreamed of by LEIBNITZ, drove FREGE and his successors to the invention of new symbols, which might be free from connotation of the ordinary speech. PEANO even invented a new language to connect the symbolic lines in his *Formulaire de mathématique* in order to be free from the tyranny of common meanings.

The author makes frequent reference to the term " occurrents," which we have previously mentioned. The basis of his system is found in the relationship of occurrents to awareness, content, etc. Thus we find that " meaning is a unique property attached to occurrents by virtue of which they become instruments of reference to occurrents outside of themselves." But there lurks some mystery here. Occurrents are not unique, for, depending upon their orders of abstractness, they are large, middle sized, and small. Thus the author states : " But the elements of the highly concrete occurrents are precisely the complexes of highly abstract occurrents; these are the ' middle sized ' occurrents which constitute the data for science."

Regarding the work as a whole, it appears to be an interesting attempt to formulate a system of philosophy for science, which will proceed from one idea to another in logical and coherent succession. But as the author says " the word ' idea '... is one of those peculiar philosophical words, which, once defined and introduced into a discussion, may be dismissed and not referred to again." The book should prove stimulating reading to those who enjoy abstract speculation, and who would, themselves, like to witness the erection of a framework of " concepts " upon which one can hang the undefined elements of all physical science.

Northwestern University. H. T. DAVIS.

A. Cornelius Benjamin.—*An Introduction to the Philosophy of Science.* xvi + 469 p. The MACMILLAN Co., New York, 1937. (Price $ 3.50).

In recent years we have witnessed an unusual increase in the number of books and articles devoted to the field of thought which has been generically called " the philosophy of science." To some this field may appear to be the development of very modern thought, but a casual survey of the history of philosophy and science will show that such is not, indeed, the case. From earliest times there has been a very close connection between great philosophic speculation and the best scientific knowledge of the day. What was RENÉ DESCARTES but a philosopher of science? Did Sir ISAAC NEWTON write his *Principia* as a contribution to science or as an attempt to advance the philosophical understanding of nature? In his preface to the first edition he admits : " But I consider philosophy rather than arts and write not concerning manual but natural powers... and therefore I offer this work as the mathematical principles of philosophy, for the whole burden of philosophy seems to consist in this — from the phenomena of motions to investigate the forces of nature, and then from these forces to demonstrate the other phenomena." The roots of the present interest in the subject perhaps go back to KARL PEARSON's *Grammar of Science*, and to the widely circulated essays of HENRI POINCARÉ collected under the title *The Foundations of Science*.

The writer of the present text, noting the increased interest in the philosophical implications of modern physical discovery, admits his purpose. " The attempt has been made in the following pages to acquaint the student not so much with the facts of science as with the foundations of science. What is required for the philosophy of science, as RUSSELL points out, is knowledge not of the complex features of science, but of its abstract features — a knowledge of its first chapters rather than of its last chapters." Under this assumption he feels free to eliminate many of the highly complex illustrations, particularly those drawn from relativity and quantum mechanics, which have obscured much of the literature in the field for the non-technical reader."

This point of view seems somewhat unfortunate in face of the fact that the new knowledge which differentiates recent speculation from that found in the essays of POINCARÉ has centered around the postulates of the special theory of relativity, the connection between the law of gravitation and the content of the universe, the relationship between time and the extent of space. The ancient problems of the microcosm have obtained new vigor from the discoveries recorded in the literature of the quantum theory and wave mechanics; the controversy over the problems of determinism has obtained new meaning from the principle of indeterminacy in the world of photons and electrons. How can one approach the new philosophy without some technical appreciation of these modern sources of knowledge?

But it must be freely admitted that the teacher of the philosophy of science is faced with perplexing difficulties. Laboratory and mathematical knowledge necessary to understand with any precision the fundamental tenets of modern physics can be acquired only slowly and with great difficulty. Few students have had sufficient training to encompass any considerable part of the new domain, and superficial inspection only serves to leave them with a confused view of the vast terrain now occupied by modern science. Where, in the older literature, a chair was a sufficient datum to serve as an object of material nature, in the new knowledge the seething activity of the constituents of the atoms of the chair must now be used. The discovery that matter can exist in a state as dense as 50,000 times that of water, shows that the chair, after all, is mainly space which takes form only through restraints upon the statistical activity of the electrons which occupy it. The author of the present work has cut the Gordian knot by omitting technical knowledge; he approaches the problem from the point of view of the postulates of logic and from the forms of thinking useful in understanding the problems of the new physics.

This approach is easily ascertained through inspection of the following chapter headings : 1) Philosophy and science; 2) Philosophy of science; 3) The logical structure of science; 4) The nature of symbols; 5) Perception; 6) Descriptive techniques; 7) Descriptive science; 8) Theories of scientific concepts; 9) Scientific discovery; 10) Explanatory science; 11) Verification techniques; 12) Problem of the analysis of scientific concepts; 13) Order, number, quantity; 14) Space, time; 15) Motion, force, matter; 16) Law, cause; 17) General character of speculative problems; 18) The classification of the sciences; 19) Human freedom; 20) The nature of reality. These chapters are categorized in an introduction and three parts. The first two are included under the heading " The Field and Philosophy of Science," the next nine under " Problems in the Logic of Science," the next five under " Problems in the Analysis of the Concepts of Science," and the remaining four under " Speculative Problems."

After a very brief historical introduction, the book opens with contrasts between description, as the function of science, and explanation as the domain of philosophy. The author then refers to the second dichotomy, popularly called that of logical positivism, where description and explanation are placed within the domain of science, but where " to philosophy has been assigned the task of the logical clarification of ideas." Attention is called to the third possibility where " the relation between science and philosophy is based on the dichotomy of facts and values " and to the fourth, " which apportions all discussions of the quantitative

aspects of experience to science and all considerations of the qualitative aspects to philosophy." The author maintains that these assumed dichotomies should be rejected in favor of the formulation of " a philosophy of science."

The second chapter of the introduction attempts to define the domain of the philosophy of science, which in the author's view has three aspects. The first of these is the " speculative, synthetic, or synoptic philosophy," the second " the logic of science, or the philosophy of method," the third " the metaphysics of science, or metaphysical science."

After these preliminaries, the book begins with a discussion of the logical structure of science. An interesting emphasis is placed upon the point that the creators of science never know in the beginning what they are about to create. Thus he says : " Physicists who begin by talking about matter and by considering electrons, fields of force, and probability waves; mathematicians who limit their subject to number, order and quantity find themselves talking ultimately about the structure of deductive systems; biologists who insist that their discipline is a study merely of the reactions of living organisms to stimuli of various kinds find themselves obliged to talk about the chemical structure of organic compounds."

The author gives an illuminating discussion of the significance of symbols in science. He says : " The scientific activity is centered about the attempt to devise a system of symbols which claims to be representative in some sense of a realm of events with which the scientist has direct acquaintance." This isomorphism of symbols with events is, of course, the basis of exact science. It is a pity that the author does not instruct the student more fully by citing a single example. The symbolic relationship between the swinging pendulum and the differential equation of its motion is more illuminating than any number of pages of words about the meaning of operational arguments.

A set of concepts designated by the letters A, M, B, F, and O run as a thread through a considerable part of the book. A is epitomized by the word awareness, M is the complex of mental elements, B the " complex of elements which constitute the body of the perceiver," F the elements of the physical medium and O the " end object." M, B, and F function as operators between A and O. The author constructs a table, resembling a genealogical tree, to connect these five elements, but the attempted construction does not seem to clarify the relationships.

The author pays attention to most of the new approaches which have been devised for studying the problems in the philosophy of science. Thus we find the operational concepts of BRIDGMAN, the isolation theory of LEVY, the linguistic difficulties of the sematic school, the points of

view of the empiricists, the logical positivists, and the various types of realism.

An interesting symbolic construction of the form S = f(D, O) is presented, where S is any scientific symbol, D represents data, and O is the operation of knowing. The problem is to discover what sense may be assigned to the functional symbol. The concept of function is certainly not used in any precise mathematical sense and the discussion does not leave one with a feeling of having gained an added insight into the complex relationship hinted at by the symbolic equation.

The chapter on order, number, and quantity is well done. The clarity of this chapter in comparison with some of the others is probably due to the introduction of precise postulates, which are taken mainly from HUSTINGTON's brilliant exposition of the " continuum," and from J. W. YOUNG's " Fundamental Concepts of Algebra and Geometry." The value of the postulational approach to philosophical problems is clearly shown in this chapter.

The fundamental concepts of physical science, represented by the words " space and time," " motion, force and matter," " law and cause " are treated with some reference to such modern physical discoveries as relativity and HEISENBERG's indeterminacy principle. The chapter could have been illuminated by more such specific reference. It is difficult to see how a book on the foundations of science, particularly as it refers to cause and law, could neglect mention of the law of least action and fail to discuss fully the concepts of thermodynamics. Entropy receives only two brief mentions, in spite of the fact that it bridges the gap between the speculations of probability and the empirical facts of a great domain of physics.

The book concludes with a discussion of what the author calls the main speculative problems : " 1) The problem of the classification of the sciences; 2) The problem of human freedom, and 3) The problem of the nature of reality." The author's conclusion is " that the problems of the immediate future are the critical rather than the speculative ones. Fortunately, the attention of investigators has been increasingly directed in recent years to problems of formal logic and the general theory of symbols; to problems of actual scientific methodology; and to problems of the foundations and interrelations of the sciences. These offer great promise for the future."

It will be seen from the foregoing that the book is one, which should prove highly stimulating to the student of philosophy, who is capable of abstract speculation. The field of the philosophy of science is one of the most profound and difficult of our day, and it should be approached from a background, which includes the history of philosophy on the one

hand and the history of science on the other. Mastery of these great disciplines is not easily attained. The author's work, from the point of view of pure philosophy, will make an excellent supplement to the literature of the subject which has grown mainly under the pens of the physicists themselves.

Northwestern University. H. T. DAVIS.

Ludwig Kast.—*Josiah Macy, Jr. Foundation.* A review by the President of activities for the six years ended December 31, 1936. With extracts from the Treasurer's reports for the years 1932-1936. 137 p., 4 portraits. New York, Josiah Macy, Jr. Foundation, 1937.

This is a record of the inception and establishment of the JOSIAH MACY, Jr. Foundation and of the activities out of which its program and policies have been developed. The Foundation is concerned primarily with health-care. This survey is a historical document of considerable value as a source book in the history of science for two reasons. In the first place, it contains a clear and comprehensive statement of current significant trends in medicine as an art and in the basic biological and physical sciences upon which the art is based. Of still greater importance is the recognition and utilization of the organismic concept as a guiding principle in the activities of the Foundation. This leads to the psychosomatic approach of both research and its applications to the patient as an individual responsive to his environment.

A second reason for its historical significance is its factual record of grants-in-aid of research and its list of results in 555 scientific articles and 19 books resulting from the assistance thus rendered. These record the trends of important research activities in the United States and in certain European countries from 1930 to 1936 in the fields of biochemistry, bacteriology, neurology, endocrinology, embryology, physiology, pathology, neuropathology, psychology, psychiatry, the history of science and medicine, physics and atomic structure, and in various fields of clinical medicine and the cultural relations of the medical art.

In the period covered by this report the Foundation has made 324 grants to 34 universities and 27 other agencies in the United States and in Belgium, Czechoslovakia, France, Germany, Hungary, the Netherlands, and U.S.S.R.

A preliminary survey of the activities of foundations in the United States revealed the fact that 200 such institutions of American origin spent $ 45,000,000 annually in more than 25 distinct fields. About 50 per cent of this supported education, 25 per cent went for relief and social service, and only 20 per cent was utilized for research, largely along biochemical and physiological lines. The Macy Foundation devoted,

in its first five years of operation, $ 932,792 largely in the support of research in institutions already equipped and staffed for scientific work. In accordance with its established policy it aims to broaden the basis of medical art in the interests of human welfare.

CHARLES A. KOFOID.

Fritz Buck.—*El calendario maya en la cultura de Tiahuanacu.* XI+210 p., 101 figs., 2 fold. pl. La Paz, 1937. Published by the author (La Paz, Bolivia, Casilla No. 157). Price, two U. S. dollars.

ERWIN PAUL DIESELDORFF, of Coban, Guatemala, a resident in Central America for half a century, a profound student of Maya art and religion, is not a recognized authority on the Maya calendar. In his *Kunst und Religion der Mayavölker III* (Hamburg 1933), he introduced the expression " Short Count "—as opposed to the " long count " of the Mayologists,—and developed his ideas concerning the intercalations in the Maya calendar, stressing the alleged importance of his " grosse Schaltepoche " of 93600 days (= 13 katuns); he also offered a chronological interpretation of certain decorative designs found on Central and South American artifacts and monuments. Incidentally, he gave 554 B.C. (= end of his 11th " Schaltperiode ") as the date of the great Gate of the Sun in Tiahuanacu, near Lake Titicaca; DIESELDORFF accepted the SPINDEN correlation.

FRITZ BUCK, of La Paz, Bolivia, a collector and student of Andean artifacts, claims in his book to have dated various pieces of pottery and several architectural items, and to have proved the existence, in the pre-Incaic Andean civilizations, of calendar systems essentially identical with the Maya calendar. The author's signed drawings and sketches give evidence of his artistic abilities and of his careful analysis of the minutest details of the decorative motives found on vases and sculptured ruins. His acquaintance with the Maya calendar, however, appears to be very superficial—and almost entirely derived from DIESELDORFF. In the two chapters which FRITZ BUCK devotes to the Maya calendar, we find DIESELDORFF's " Short Count " (with the addition of many periods which were unknown to the Maya and even to DIESELDORFF); our author accepts DIESELDORFF's ideas concerning intercalation—as an established fact, not as a hypothesis,—and he adds a few details of his own which would surprise the Maya priests and even DIESELDORFF. FRITZ BUCK's " explanación de la vuelta calendaria de 52 años," given on p. 15, proves that he did not grasp the nature of the calendar round; he does not mention the 365 days of the haab; although he mentions, on p. 10, the orthodox calendar round of 18980 days (" vuelta calendaria de 52 años solares "), he uses, in his calculations, a period of 18720 days

(" vuelta calendaria de 52 años Tun "); it is hardly necessary to point out that 18720 days bring back the tzolkin date but not the calendar-round date—and that the period is, therefore, neither a calendar round nor an important unit in the Maya system of periods. Our author did not understand the connection between the double tzolkin, the lunar calendar, and eclipses; his statement concerning solar eclipses, on p. 173, may serve as another example of his lack of familiarity with the facts of elementary astronomy.

Initial series, period-ending dates, calendar-round dates, and similar chronological devices used by the Maya permit us to determine the relative age of the Maya monuments and artifacts bearing calendarial inscriptions; by adopting, provisionally, one of the correlations between the Maya and the Christian calendars, we may even speak of the absolute age of the dated Maya objects. A Maya monument bearing the date 10.8.0.0.0 4 Ahau 13 Cumhu may or may not commemorate the Maya date corresponding to A.D. 728 January 25 (Julian)—it unquestionably marks the end of 10 baktuns and 8 katuns, or the lapse of 1497600 days in the long count. In the case of the Andean antiquities studied by FRITZ BUCK, no dating of this kind is possible, for the simple reason that nothing analogous to the calendarial inscriptions of the Maya has been found in their decorative motives. FRITZ BUCK's dating of the vases from the Peruvian coast and of the ruins in the Lake Titicaca region rests on the interpretation of the geometrical or zoomorph designs as representing " Maya " periods, i.e., DIESELDORFF's periods of intercalation. Our author follows in the footsteps of DIESELDORFF, although he tries to convey the impression that his method is his own. The favorite period of our author consists of 4160 " años," i.e., of 4160 tuns or of 1497600 days; from the Maya point of view, this period leads us to 10.8.0.0.0 4 Ahau 13 Cumhu, a date of little significance; from DIESELDORFF's point of view, 4160 tuns represent 16 " grosse Schaltperioden " of 93600 days each. Every time FRITZ BUCK succeeds in interpreting a geometrical or zoomorph pattern as representing 4160 " años," he informs the reader that the object dates from the end of the 16th " Maya " (i.e., DIESELDORFF) period, and since he accepts, with DIESELDORFF, the SPINDEN correlation as an established truth, he knows that the object belongs to the year 728 of our era. In order to interpret a pattern as representing 4160 " años," the author decomposes it—with much ingenuity and naïveté—into elements to which appropriate numerical values are assigned; the same decorative element may have different values, as the case may require; by adding and multiplying these numerical values of the elements of the design, the number 4160 is reached—and we have, " clara e indudablemente, la fecha de la fabricación " of the

object, i.e., " el término del período 16, que corresponde en nuestro calendario al 25 de enero del año 728 después de J. C." Incidentally, the number 4160 is usually the sum of an appropriate number of multiples of the " vuelta calendaria de 52 años Tun " which, as we have seen, should not be confused with calendar rounds familiar to Mayologists. The method applied by our author to Andean pottery could be used, with equal success, for the dating of ancient Greek pottery; many of the geometrical patterns are identical on Greek and on Andean vases; our author does not, fortunately, attempt to establish a connection between the Mediterranean and the Andean civilizations. The author's ability to find " este número 4160, escrito por los antiguos sacerdotes en forma tan velada," has enabled him to assign the same date, A.D. 728, to objects varying in style and belonging to different geographical regions; such samples of pottery from the Peruvian coast as the Pacheco vase and the items Nos. 26/2, 815, and 5680 in the National Museum in Lima, bear " este número 4160 "; the Bolivian vase (FIG. 58*c*), too, was made A.D. 728; a beautiful textile pattern, probably from Pachacamac (FIG. 59) bears the same date; the great Portada del Sol in Tiahuanacu also bears the date marking the end of the 16th " Maya " period (only thirteen centuries later than the end of the 11th period assigned by DIESELDORFF to the same monument). Our author was able to identify the number 4160 on several other objects, but he had reasons for assigning their manufacture to different dates; thus, the BAESSLER vase, in Berlin, bears, of course, the ubiquitous date, 4160 " años," but it also bears 26 double disks which are interpreted as representing 52 additional " años "; the author concludes—the italics are his—" *Por tanto, el vase ' Baessler ' es, en 52 años, más reciente que el vaso ' Pacheco '.*" In a few cases, the author was quite unable to find the number 4160 in the decorative patterns—and had to be satisfied with other dates; thus, the geometrical decorations on No. 1638 in the National Museum, Lima, reveal to our author that this piece of pottery from the Peruvian coast was made A.D. 343.

It seems to this reviewer that books of this type are dangerous, not harmless: archaeologists who are not familiar with the Maya calendar may be impressed by the " mathematical proofs " offered by the author, and may be led to believe that the author's arguments are sound.

A. POGO.

C. D. Darlington.—*Recent advances in cytology.* With a foreword by J. B. S. HALDANE. Ed. 2, xvi+671 p., 16 pls., 160 figs. in text, 81 tables. Philadelphia, P. BLAKISTON's Son & Co. Inc., 1937. Price $ 6.00.

This is a work of first rate importance because of its critical and comprehensive scholarship and the significance of its subject matter. Cytology fills a central position in modern development in biology. It constitutes the basis of genetics, heredity, and evolution. On its dynamic side it also underlies many aspects of physiology. Although announced as a second edition it is in reality an up-to-date epitome of the progress in this field in the first third of the 20th century, a period in which cytological research has made the most of its significant progress. As HALDANE indicates in his foreword, modern cytology has developed two outstanding features, namely, its principles are the same for plant and animal cells and the uniformity of nuclear mechanisms can be extrapolated with great confidence into the past so that the deduction may be made that the principles of genetics and the method of evolution were much the same in remoter geological epochs as they are today.

This book records a shift in method in biology.

> "For some centuries the deductive method in the biological sciences has been very properly suspect. But first in genetics, and now in cytology, we have returned to it. General principles have been discovered of such wide validity that we can predict from them with considerable confidence, and on the rare occasions when the prediction is falsified, we are inclined to look for undetected causal agencies rather than to recast our first principles. This attitude has long been normal in chemistry and physics. Its introduction into biology... is a sign of the growing unity of science."

The author notes the earlier method in cytology of simple description and the current one of finding out *why* things happen in the cell. This latter method plunges the investigator into speculative inferences which connect mechanics, physiology, and genetics. It reveals the cell as a part of an interlocking system of growth and reproduction, heredity and variation. Everything that happens in the cell is related to all that happens in the organism or has happened in its ancestors.

In the first edition the evolutionary point of view of cytological phenomena was elaborated and defended as a changing genetic system adapting itself to its own requirements. Increasing knowledge of genotypic control and light from the coordination of seemingly conflicting data of the chiasma-type theory of crossing-over and precocity of meiosis make possible an even more rigorous application of this point of view in this edition. A larger view is now also possible of chromosome behavior, nuclear- and cell-division as they reveal the laws of movement of cell structures and the causes of such movements. Thus in the cell there are now brought together mechanics, physiology, and physical chemistry in a unity of living processes.

The researches under review and syntheses are organized under the

headings of cell genetics; mitosis and the constancy of and variations of chromosomes; meiosis in diploids and polyploids, structural hybrids; the behavior of polyploids with reference to experimental origin, pairing, segregation, fertility, classification, and development; mechanical aspects of chromosomes in heredity in segregation, crossing-over in normal individuals and in structural hybrids; physiological aspects of chromosomes as to differential behavior, balance, genes, and the inert chromosomes and genes; permanent hybrids; adventitious breakdowns of the genetic system in mitosis and meiosis and their consequences; controlled breakdowns in the genetic systems in relation to life cycle, non-recurrent apomixis, parthenogenesis, and replacement of sexual reproduction; and cell mechanics.

The appendices contain an illuminating chapter on interpretation of cytological structures and phenomena, a list of references to 15 categories of new cytological techniques; a glossary of nearly 200 cytological terms; a bibliography of 73 pages with nearly 1800 titles, and a well-organized index.

CHARLES A. KOFOID.

Richard Hesse, W. C. Allee, and Karl P. Schmidt.—*Ecological Animal Geography.* An authorized, rewritten edition based on *Tiergeographie auf oekologischer Grundlage.* XIV + 597 p., 135 figs. in text. New York: JOHN WILEY & Sons, Inc.; London: CHAPMAN & HALL, Ltd., 1937. Price $ 6.00 net.

Ecology is one of the newest of the segregating disciplines of biology. Plant ecology was first in the field because of the fixation of the organisms with which it deals, the better segregation of its literature, and largely because of the completeness of the data assembled in herbaria and because of its vital relations to agriculture. SCHIMPER's *Pflanzengeographie auf physiologischer Grundlage* (1898) gave background and impetus to the movement in the botanical field and SEMPER's much less comprehensive *Animal life as affected by the natural conditions of existence* (1881) opened the subject in the zoological one. ADAM's pioneer work in this field and SHELFORD's exhaustive summary of physico-chemical methods and results in his *Animal communities in temperate America* (1913), and the founding of *The Journal of Ecology* (1913) gave both stimulus and opportunity for this new discipline in America. Later investigators, notably ELTON in his *Animal ecology* (1927) and CHAPMAN in his *Animal ecology, with especial reference to insects* (1925) intensified interest in the ecology of vertebrates and insects, respectively.

HESSE's *Tiergeographie* (1924) which forms the background of this joint work had in the meantime appeared in Germany. It is extensively

revised and supplemented in this translation. The authors frankly state that they omit interpretations with which they do not agree. All Lamarckian interpretations are therefore not admitted. Much greater emphasis is placed on the factor of temperature than in the earlier work which extensively utilized data derived from homoiothermal birds and mammals and therefore minimized climate as an important factor in animal distribution. The increase of knowledge of the ecology of cold-blooded animals tends to emphasize all climatic factors, temperature, rainfall, relative humidity, and sunlight. Adaptations to environment underlie ecology but must be used with caution because the existing state of the environment is not that under which such adaptations necessarily had their origin.

The work is a useful and stimulating one and fills a real need. The field of pelagic life is least developed and up-to-date and that of parasitism wholly omitted.

CHARLES A. KOFOID.

Robert H. Lowie.—*The History of Ethnological Theory*. — xiii+296 p., New York, FARRAR & RINEHART Inc., 1937, ($ 3.00).

In the present work Professor LOWIE has written the first history of ethnological theory to make its appearance in any language. Works such as A. C. HADDON's admirable little History of Anthropology, London, (*Isis* 25, 291), and T. K. PENNIMAN's A Hundred Years of Anthropology, London, 1935 (*Isis*, 26, 229) are not actually histories of ethnological theory; their scope is at once more broad and less intensive than is Professor LOWIE's new book, which is devoted only to that part of anthropology which concerns culture. By " culture " is to be understood " the sum total of what an individual acquires from his society — those beliefs, customs, artistic norms, food-habits, and crafts which come to him not by his own creative activity but as a legacy from the past, conveyed by formal or informal education." (p. 3).

The distinguishing mark of this history lies in Professor LOWIE's selection for discussion of only such individuals and schools as have exercised some influence upon the development of ethnological thought. There is no overcrowding of his pages with the names of ethnologists who may, at one time or another, have achieved a certain passing prominence. In Professor LOWIE's book one is able to see the wood because the judicious selection of the trees does not obscure the view. The result of this procedure is a beautifully integrated exposition and analysis of ethnological theory from CHRISTOPH MEINERS (1785) to the present day.

Another great merit of the book is its forthrightness. With a full grasp of the material Professor LOWIE dispassionately examines the

contributions of individuals and schools, and states his findings with the impartiality of the first-rate scientist that he is. There is no mincing of words; he is not afraid to call a living man great and a dead one shallow, and he does not hesitate to bestow praise and blame upon one and the same man. His analyses of the contributions of such men as BASTIAN (1826-1905), MORGAN (1818-1881), TYLOR (1823-1917), and BOAS (1858-) are masterly. In many ways the most effective disposal of any " thinker " that I remember to have seen anywhere is Professor LOWIE's diverting examination of the ethnological theories of the late Sir GRAFTON ELLIOT SMITH (1871-1937).

Since a great deal of space is devoted to the work of living individuals and schools the book will prove invaluable as well as indispensable to all who wish to be intelligently informed concerning contemporary ethnological thought; and with respect to the earlier history of ethnological thought it may at once be said that there nowhere exists so excellent a treatment of the subject.

The early history of ethnological theory is almost entirely restricted to the 19th Century, for as Professor LOWIE points out, since " ethnological theory can proceed sanely only on a wide foundation of fact," theory was perforce dependent upon the by-products of geographical discovery. When the recency of geographic discovery is considered, together with the lateness of the development of an interest in the pots, pans, and practises of primitive peoples, it is not difficult to understand why ethnological theory did not actually assume some definite shape until the middle of the 19th Century. It was only when men like BASTIAN, MORGAN, TYLOR, and BOAS went out into the field to observe cultures in actual operation, to bring back the facts, and arrange and classify them that the science of ethnology was born. It was the pioneer work of L. H. MORGAN, a Rochester lawyer, on the kinship terminologies of American Indian tribes which first served to convince the world of the scientific possibilities of this new branch of knowledge. The extent of MORGAN's influence was enormous, (See : BERNHARD STERN, *Lewis Henry Morgan*, Univ. of Chicago Press, 1931), indeed, it is doubtful whether any single ethnologist has ever had such an effect upon his contemporaries. What MORGAN began it fell to TYLOR and to BOAS to place on an extended and solid foundation. TYLOR's systematic works brought his views to the attention of the civilized world. BOAS has, however, never published a system of ethnology, though his writings on the methodology and the field and scope of ethnology are numerous. Because BOAS has never brought his ideas together in a single treatise of the kind that TYLOR published, his work is not as well known as it should be outside America. However, the numerous students trained

by BOAS, and Professor LOWIE is among them, have independently done their share to make the rest of the world acquainted with the method and theory of BOAS. The origin of the method and theory presented by these writers in their own works is, however, rarely directly accredited to BOAS (for the same reason that a modern writer on the calculus thinks it unnecessary to state his obligation to LEIBNITZ and to NEWTON); there is some reason to believe that Professor BOAS may present the world with a systematic treatise from his own pen in the not far distant future. The publication of that work will prove an event of major importance.

Professor LOWIE's book is justly bound to assume a place as the standard work on the subject with which it deals.

Hahnemann Medical College, Philadelphia. M. F. ASHLEY-MONTAGU.

Kate Campbell Hurd-Mead.—*A history of women in medicine from the earliest times to the beginning of the nineteenth century.* XVI + 569 pp., 38 pls., 23 figs. in text. Haddam, Conn., The Haddam Press, 1938. $ 6.00.

There can be no doubt that women, from the most primitive times have had a close and intimate relationship to the healing arts. This personal intimacy has given women the advantage and opportunity of practical experience of illness and its care, though their knowledge of disease processes, by the same tokens, is often limited. The reputation of such women, even though widely experienced, is as often as not but local, and with the exception of the few who have written, reference to their work in the history of other times is as a rule extremely oblique. What valuable discoveries or observations they may have made are for this reason often lost and their personalities but shadowy legends. These and the social position of women are among the features which make a compilation of their history in medicine a task always difficult, and for some epochs, unsatisfactory and obscure.

In her preface to this work, the author tells us that inspired by the enthusiasm of OSLER, WELCH and KELLY for the study of medical history, she began in 1890 her search for the story of woman's place in the development of medicine. The exigencies of professional practice however compelled her to do little more than accumulate material but, freed from these ties since 1925, she has been able to gather and study through personal research and travel much additional information derived from original sources.

Dr. HURD-MEAD in the volume before us attacks the subject in a very ambitious manner, so that the work amounts to a great deal more than a history of women in medicine and approaches a history of medicine

in general. The author carries her story, century by century, from primitive times through Egypt, Greece and Rome into mediaeval Europe and on through the Renaissance up to the end of the eighteenth century. A second volume is contemplated and will complete the tale of women's achievements in medicine up to modern times. Her general plan is to present in each epoch or century, its background, the medical advances and outstanding contributions, and from thence, to pass on to a consideration of the medical women of the period.

It is this very method of approach which has made Dr. HURD-MEAD's book unsatisfactory in many respects. As a history of medicine, and indeed this is claimed for the work in the publishers' notice, it is inadequate, sketchy, uncritical and not without an excessive number of errors both of fact and of interpretation. For example we read in a single paragraph on p. 377 that VESALIUS in 1573 (misprint for 1537) took his medical degree in Basel, whereas he received in 1537 his doctorate at Padua; that ten years after the publication of the *Fabrica* in 1543, he burned his notes, whereas this famous episode is mentioned in his letter on the China Root 1546; and that he died in 1565 whereas he died in 1564. In addition the entirely apocryphal story of the cause of his pilgrimage of penance to Jerusalem is given without any indication of its legendary character. Nor is it correct to say that GALEN (p. 76) makes no mention of the Christians or any other religious sect, for in several places he refers somewhat slightingly to both Christianity and Judaism. Among other places it may be mentioned in passing that references to Christianity will be found in books I and III of the "*De Differentiis Pulsuum.*"

The reviewer feels that Dr. HURD-MEAD's summing up of the sixteenth century will not find much favour when she says "It is obvious that the sixteenth century was one of extreme and puzzling contradictions, because the whole Renaissance was a great transitional period of thought. It was really a stage of mental adolescence. A few new ideas gave its students a feeling of superiority and of independence of action that were positively sophomoric; although they succeeded only in bringing upon their heads the wrath of both Church and State."

In the sections devoted to women in medicine the author with high enthusiasm reminds us of many interesting characters and has brought to light many who otherwise would have remained obscure. The unselfishness, patient self-sacrifice and real ability of these women is glowingly depicted. It is regrettable that our knowledge of some of these women and their works is so fragmentary and so often legendary. However the author asserts that as tradition has been more prone to distort events related to women than to men, consequently we may

regard the survival of such legendary tales despite " jealousy, calumny, carelessness and indifference " as evidence that makes it " all the more probable that they were based on solid and substantial fact."

The subject of obstetrics and the care of children are of course of special interest to women and naturally the midwife and works related to midwifery and its conduct receive very full consideration. However the author is given, on the thinnest of evidence to elevate unwarrantably the midwife and handy-woman to the rank of physician, and not infrequently confuses the issue by defining her distinction at times and not at others. In this connection we note that the author, on p. 338, speaks of RÖSLIN's '*Rosegarten*' and its English translation and then, as though it were another work, of RAYNALD's '*Byrth of mankynde*.' Incidently the edition of RAYNALD's work mentioned, 1545, is that revised " from top to toe." There is an earlier edition of 1540.

That the author's advocacy for women has overcome her judgment is nowhere more strikingly evident than in the titles accompanying several of the illustrations. For example in the cut on p. 303 from SINGER's edition of the Fasciculo di Medicina (1493), a physician of the " long robe " is dubbed a woman doctor and again in the plate facing p. 370 the physician becomes a woman surgeon solely on the evidence of long hair and long robe. Again in the well known painting of JAN STEEN's reproduced facing p. 327, the 'howdy' assisting the quack is described as a woman surgeon.

It is scarcely within the compass of this review to detail more of the too many errors. Advocacy has no place in an historical work and is detrimental to and weakens the author's cause. The chief merit of the work lies in bringing forward the role of women in medicine, a subject too long neglected.

(University of California) JOHN B. DE C. M. SAUNDERS.

Fifty-fourth Critical Bibliography

of the
History and Philosophy of Science and of the History of Civilization

(*to end of April* 1938—*with special reference to sections* 34 to 49 *inclusive*)

This fifty-fourth bibliography contains about 820 items of which 399 deal with sections 34 to 49 inclusive. They have been kindly contributed by the twelve following scholars belonging to four countries :

C. W. Adams (Hertford, England)
M. F. Ashley-Montagu (Philadelphia)
E. G. Carpani (Bologna)
L. Guinet (Brussels)
A. W. Hummel (Washington, D. C.)
C. A. Kofoid (Berkeley, Calif.)
R. K. Merton (Cambridge, Mass.)
M. Nierenstein (Bristol, England)
J. Pelseneer (Brussels)
A. Pogo (Washington, D.C.)
S. Sakanishi (Washington, D. C.)
G. Sarton (Cambridge, Mass.).

This Bibliography includes as usual a series of addenda and errata to Sarton's *Introduction to the History of Science*, vols. 1 and 2 (Baltimore and London, 1927 and 1931). Its purpose and methods have been explained in the preface to the 38th Critical Bibliography (*Isis* 20, 506-08).

Sections 34 to 49 inclusive dealing with anthropological and historical sciences are especially full, as I have liquidated as much as I could of my stock of notes concerning them.

I have in my drawers a large number of notes which I will be glad to publish as soon as I have been able to check them upon the originals.

The Historical classification (Part II) contains a new section (IV), " The New World and Africa " divided into three subsections *a*) America, *b*) Oceania, *c*) Africa. (These subsections have not been numbered in order not to disturb the numbering of sections of Part III).

I entreat the authors of relevant books and papers to send me copies of them *as promptly as possible* in order that their studies may be registered in this bibliography and eventually reviewed and discussed. By so doing they will not simply help me and every other historian of science but they will help themselves in the best manner, for they will obtain for their work the most valuable publicity and its certain incorporation into the literature of the subject.

Many of the notes were checked and the final manuscript and proofs of this Critical Bibliography were kindly read by Dr. M. C. Welborn and I. B. Cohen.

Harvard Library, 185,
Cambridge, Mass.

George Sarton
May 20, 1938.

PART I

FUNDAMENTAL CLASSIFICATION (CENTURIAL)

VIth century B.C.

Carpani, Enrico G. Yin-fu-king e Tao-teh-king. Commento al significato filosofico dei due testi. 16 p. Reggio-Emilia, CAITI, 1935. ISIS

Vth century B.C.

Souques, A. La douleur dans les livres Hippocratiques. Deuxième partie, Affections des divers systèmes et appareils. 1. Affections du système nerveux. *Bulletin de la société française d'histoire de la médecine* 31, 279-309, 1937. ISIS

IVth century B.C. (second half)

Jaeger, Werner. DEMOSTHENES, the origin and growth of his policy. X+273 p. University of California Press, 1938. ($2.50). ISIS

"After a period of flowering in the nineteenth century, studies on DEMOSTHENES were neglected more than any other field of classical literature. The verdict pronounced by modern historiography on DEMOSTHENES as a statesman exercised a paralyzing effect also upon philological research. But nevertheless, without DEMOSTHENES it is impossible to understand the fateful intellectual and political struggle of Greece in the fourth century B.C. This book does not give a biography or a reconstruction of the historical events. It aims at a reinterpretation of DEMOSTHENES' orations as the authentic documents of his political thought and action. Paradoxically, the practical political thought of the Greeks has been investigated less than their political theory. The present book may help to elicit from DEMOSTHENES' orations themselves the criteria for their political understanding."

Wolfson, Harry Austryn. The amphibolous terms in ARISTOTLE, Arabic philosophy and MAIMONIDES. *Harvard theological review* 31, 151-73, 1938. ISIS

Ist century B.C. (whole and first half)

Lucretius. De rerum natura. Translated by R. C. TREVELYAN. XVI+296 p. Cambridge, University Press, 1937. ISIS

Mattingly, J. R. Cosmogony and stereometry in Posidonian physics. *Osiris* 3, 558-83, 1937 (publication delayed until March 1938). ISIS

" Much can be gained for an understanding of the historical development of Neo-Platonism by the hypothesis that it has an important historical connection with Middle Stoicism. The focal point for that side of Middle Stoic doctrine here in question, it can hardly be doubted, is the system of POSIDONIUS, and it is in this sense that POSIDONIUS' theology is a step beyond the *Timaeus* taken in the direction of the theology of PLOTINUS."

Ist century (second half)

Becker, Oskar. *Παραμηκεπίπεδοι ἀριθμοί.* Die Zahlen von der Form n.n. (n±1) bei NIKOMACHOS von Gerasa. (Mit einem Anhang über die Platonische Hochzeitszahl). *Quellen und Studien zur Geschichte der Mathematik, Astronomie und Physik*, Abtg. B : Studien, 4, 181-92, 1938. ISIS

Dioscorides (*Intr.* 1, 259). " ...Mentions the earliest reactions of wet analysis, the detection of iron vitriol by means of gall-nut juice..." This, I am afraid, is not correct. Your statement really refers to PLINY and not to DIOSCORIDES, and the whole question has already been dealt with in my paper, entitled : " The early history of the first chemical reagent," *Isis* 16, 439, 1931. DIOSCORIDES's contribution, or lack of contribution, was dealt with by me in footnote 1 of this paper.
Bristol. M. NIERENSTEIN. ISIS

Millar, Eric G. Leaves from an illuminated manuscript of FRONTINUS. *British museum quarterly* 12, 8, 1 pl., 1938. ISIS

IInd century (second half)

Hauke, Erika. GALEN : Dass die Vermögen der Seele eine Folge der Mischungen des Körpers sind. 38 p. (*Abhandlungen zur Geschichte der Medizin und der Naturwissenschaften*, H. 21). Berlin, EBERING, 1937. ISIS

IVth century (second half)

Rome, A. Les observations d'équinoxes et de solstices dans le chapitre 1 du livre 3 du *Commentaire sur l'Almageste* par THÉON d'ALEXANDRIE. (première partie). *Annales de la société scientifique de Bruxelles* 57, 213-36, 1937. ISIS

" D'après THÉON D'ALEXANDRIE et PTOLÉMÉE, on décrit la construction, l'installation et le mode d'emploi des appareils ayant servi à observer les équinoxes et les solstices. On examine les discussions (et même les calculs)

des erreurs que les anciens font à propos de ces observations. Dans une seconde partie, qui paraîtra plus tard, on étudie, d'après les mêmes sources, la critique que les anciens font de certaines mesures de la distance entre l'Épi et le point automnal, amenant des résultats paradoxaux."

Rome, A. Les observations d'équinoxes et de solstices dans le chapitre 1 du livre 3 du Commentaire sur l'Almageste par THÉON d'ALEXANDRIE (seconde partie). *Annales de la société scientifique de Bruxelles* 58, 21 p., 1938. ISIS

" Dans une première partie (*Ann. soc. scient.* 57, 1937, 1, p. 219-36), on a décrit les observations directes d'équinoxes et de solstices, et la discussion que les anciens font des erreurs de ces observations. On examine maintenant les difficultés que créaient à HIPPARQUE certaines mesures de la distance entre l'Épi et le point automnal. Enfin, de l'ensemble des faits rencontrés dans les deux parties, on tire des conclusions sur le but d'HIPPARQUE et les procédés de PTOLÉMÉE."

VIth century (whole and first half)

Skeat, T. C. A Greek mathematical tablet. *Mizraim, journal of papyrology, Egyptology, history of ancient laws, and their relations to the civilizations of Bible lands*, 3, 18-25, 1936. ISIS

" The two incomplete and illiterate texts here published illustrate in a not uninteresting way two aspects of Greek mathematics in sixth-century Egypt. They cover both sides of a wooden tablet which with five others was acquired by the British Museum in 1925. The six tablets, now numbered Additional MS. 41203 A-F, originally formed one set, but their correct order cannot now be determined and the leters assigned to them are purely arbitrary; their contents are of so miscellaneous a character that there seems no objection to publishing them individually, especially since each side is complete in itself. The tablet here dealt with is perhaps the best preserved and most legible of the set; it measures 15 × 10.7 cm., and is covered with a thin plaster wash, pink on the *recto*, yellowish on the *verso*, which being the outer surface is much rubbed. The style of writing points to a date in the 6th century A.D. The *recto* is in a hand much more cursive than the *verso*, but the writer was probably the same throughout."

IXth century (second half)

Heym, Gerard. AL-RÂZÎ and alchemy. *Ambix* 1, 184-91, 1938. ISIS

Partington, J. R. The chemistry of Râzî. *Ambix* 1, 192-96, 1938. ISIS

Robson, James. The *Kitâb al-malâhî* of ABÛ ṬÂLIB AL-MUFAḌḌAL IBN SALAMA. Translated by JAMES ROBSON, with introduction

and notes, including notes by H. G. FARMER, on the instruments. *Journal of the royal Asiatic society* 231-49, 1938. ISIS

Ruska, Julius. Das chemische Hauptwerk des Arztes RAZI. *Die Umschau in Wissenschaft und Technik* 41, 852-53, 1937. ISIS

Schleifer, J. Zu zwei arabischen Medizinbüchern. *Der Islam* 24, 74-89, 1937. ISIS

Apropos of the *Book of al-dakhîra* of THÂBIT IBN QURRA edited by G. SOBHY (Cairo 1928; *Isis* 13, 364-65). G. S.

Xth century (second half)

Skoss, Solomon L. A study of the uses of letter " yōd " by DAVID BEN ABRAHAM AL-FÂSÎ. Translated from the Arabic. *Journal of the American oriental society* 58, 167-72, 1938. ISIS

XIth century (whole and first half)

Meyerhof, Max. The cataract operations of 'AMMAR IBN 'ALÎ AL-MAWSILÎ, 117 p., pls. Barcelona, Laboratorios del Norte de España, 1937. ISIS

Edition of the Arabic text with translations and introductions in Spanish, English, French and German. Beautiful publication presented to the members of the International congress of ophthalmology which met recently in Cairo. G. S.

Renaud, H. P. J. Sur les noms de serpents dans AVICENNE (à propos d'une étude du Dr. PAUL DELAUNAY : " Les animaux venimeux dans RABELAIS)." *Hespéris* 217-20, 1937. ISIS

(Sînâ, Ibn). Le neuvième centenaire d'IBN SÎNÂ. Notice by Ş. GÜNALTAY and SÜHEYL ÜNVER. *Isis* 28, 94, 1938. ISIS

(Sînâ, Ibn). Türk Tarih Kurumu, IBN SINA, Büyük türk filozof ve tip üstadi, Šahsiyeti ve eserleri hakkinda tetkikler (le grand philosophe et maître de la médecine AVICENNE, études sur sa personnalité et ses œuvres). 900 p. Istanbul, KITAP, 1937. ISIS

Reviewed by A. ADNAN, *Archeion* 19, 411-14, 1937 (received April 1938).

Ünver, A. Süheyl. Un éloge dans lequel IBNI SINA est pris comme mesure. *Türk tib tarihi arkivi*, vol. 2, 59-60, 1937. ISIS

XIth century (second half)

Nunemaker, J. Horace. A comparison of the lapidary of MARBODE with a Spanish fifteenth-century adaptation. *Speculum* 13, 62-7, 1938. ISIS

Smith, Margaret. Al-risâlat al-laduniyya. By ABÛ ḤÂMID MUḤAMMAD AL-GHAZÂLÎ (450/1059-505/1111). Translated. *Journal of the royal asiatic society* 177-200, 1938 (to be cont'd). ISIS

XIIth century (whole and first half)

Johnson, Rozelle Parker. The manuscripts of the *Schedula* of THEOPHILUS PRESBYTER. *Speculum* 13, 86-103, 1938. ISIS

Levi della Vida, G. Something more about ARTEFIUS and his *Clavis sapientiae*. *Speculum* 13, 80-5, 1938. ISIS

Loomis, Roger Sherman. GEOFFREY OF MONMOUTH and the Modena archivolt : a question of precedence. *Speculum* 13, 221-31, 1938. ISIS

XIIth century (second half)

Kraus, Paul. Les " controverses " de FAKHR AL-DÎN RÂZÎ. *Bulletin de l'Institut d'Égypte* 19, 187-214, 1936-37. Le Caire 1937. ISIS

Analyse d'un écrit de l'Imâm Râzî non mentionné dans mon *Introd.* (vol. 2 ' 364). Il s'agit d'une sorte de fragment autobiographique intitulé " Munâẓarât fî siyâḥatihi ilâ Samarqand thumma jihata-l-Hind " (His discussions in the course of a voyage to Samarkand and India). A en juger pas les fragments cités et le commentaire de l'éditeur, cet écrit mériterait d'être publié et traduit complètement. G. S.

Meyerhof, M.; Sobhy bey, G. P. The abridged version of " The book of simple drugs " of AHMAD IBN MUHAMMAD AL-GHÂFIQÎ by GREGORIUS ABU'L-FARAG (BARHEBRAEUS). Edited from the only two known manuscripts with an English translation, commentary and indices. Fasc. II : letter bâ and gîm. p. 239-463, 103 p. (in Arabic). Cairo, Government Press, 1937. ISIS

Continuation of the edition the first part of which (1932) was fully reviewed in *Isis* 20, 454-57. G. S.

Sbath, Paul. Le formulaire des hôpitaux d'IBN ABIL BAYAN, médecin du Bimaristan Annacery au Caire au XIII^e siècle. *Bulletin de l'institut d'Égypte* 15, 13-78, Le Caire 1933. ISIS

Arabic edition of the *Dastûr bîmâristânî* of the Shaikh AL-SADÎD IBN ABÎ-L-BAYÂN, a Qaraite Jew born in Cairo 1161. G. S.

XIIIth century (whole and first half)

Wijk, W. E. van. Le nombre d'or. Étude de chronologie technique suivie du texte de la *Massa compoti* d'ALEXANDRE DE VILLEDIEU avec traduction et commentaire. x+158 p. 17 fig. The Hague, NIJHOFF, 1936. ISIS

Reviewed by A. POGO, *Isis* 28, 140-42, 1938.

XIIIth century (second half)

Haskins, George L. FRANCIS ACCURSIUS : a new document. *Speculum* 13, 76-7, 1938. ISIS

Heffening, W. Zum Leben und zu den Schriften AN-NAWAWÎ's. 4. Ein neues Schreiben AN-NAWAWÎ's über die Beschlagnahme der Gärten der Damaszener durch Sultan BAIBARS vom Jahre 666. *Der Islam* 24, 131-50, 1937. ISIS

XIVth century (whole and first half)

Bezdechi, St. NICÉPHORE GRÉGORAS. Un manuel de philosophie à l'usage des dames. Un échantillon d' " Arithmetica geometrica." Texte et traduction. *Anuarul institutului de studii clasice*, Cluj, 3, 33 p., 1936-38. ISIS

NICÉPHORE GRÉGORAS a écrit vers 1357 un petit traité où il répondait aux questions posées par l'impératrice HÉLÈNE, la fille de JEAN CANTACUZÈNE et l'épouse de JEAN PALÉOLOGUE. Ces huit questions sont (1) " Comment expliquer que les animaux agissent parfois comme s'ils étaient doués de raison ? 2) L'œil reçoit les sensations visuelles; 3) L'air est froid par nature; 4) Les fleuves et la mer sont humides par nature; 5) Le soleil est chaud par nature; 6) Sur l'âme; 7) Sur la notion de relation et sur l'être vivant; 8) La terre est sèche et sphérique." (L'ordre des questions varie dans différents MSS.). En 1933 l'auteur a publié les deux premières; il nous donne maintenant les six autres en grec et en français. Il a ajouté " Un échantillon d' 'Arithmetica geometrica ' dans une lettre de NICÉPHORE GRÉGORAS." G. S.

Borgese, G. A. The wrath of DANTE. *Speculum* 13, 183-93, 1938. ISIS

Schäfer, Karl Heinrich. I. Das Testament eines Würzburger Arztes an der päpstlichen Kurie vom Jahre 1348. *Archiv für Gesch. d. Med.* 30, 295-300, 1938. ISIS

Schomerus, Hilko Wiardo. Meister ECKEHART und MĀṆIKKA-VĀŠAGAR. Mystik auf deutschem und indischem Boden. X+191 p. Gütersloh, BERTELSMANN, 1936. ISIS

Reviewed by H. H. FIGULLA, *OLZ* 41, 123-25, 1938.

Shuja, F. M. Cause of refraction as explained by the Moslem scientists. 16 p. (Read at the second session of the Idara-i-ma'arif-i-Islamiya, Lahore, April 1936). Jamia Press, Delhi. ISIS

Apropos of the Tanqîḥ al-manâẓir of Kamâl al-dîn al-Fârasî, containing an explanation of refraction (vol. 2, p. 140 of the Ḥaiderâbâd edition 1348), given here in Arabic and English and discussed. G. S.

Somogyi, Josef von. Ein arabischer Bericht über die Tataren im " Ta'rîh al-Islâm " von adh-Dhahabî. *Der Islam* 24, 105-30, 1937. ISIS

Tornay, Stephen Chak. OCKHAM. Studies and selections. IX+207 p. La Salle, Ill., Open Court, 1938 ($1.75). ISIS

" The first part of this book is a series of essays explanatory to the selections from the works of OCKHAM which constitute the second part. Two of the essays, the one on OCKHAM's Nominalism, the other on his Political Philosophy, are versions of articles which appeared in the *Philosophical review* (May, 1936) and in *Church history* (Sept. 1935). The selections present the essence of OCKHAM's philosophy topically arranged. Some of the material selected introduces uninterrupted portions, other parts give a symposium of representative passages characterizing various fields arranged in such a manner as to give the effect of coherent reading material." Contents : Part one : Studies, OCKHAM's nominalism, OCKHAM's natural philosophy, OCKHAM's ethical philosophy, OCKHAM's political philosophy. Part two : Selections, Logic, Theory of knowledge and metaphysics, On the ideas of God, Natural philosophy, Ethical philosophy, Philosophy of religion, From the hundred theological sayings, Political philosophy, Appendix.

Zoubov, V. Answer 2 to query no. 63. Early editions of the *Deutsche Sphaera* of CONRAD OF MEGENBERG (*Isis* 25, 455; 27, 324-25). *Isis* 28, 92, 1938. ISIS

XIVth century (second half)

Aebischer, Paul; Olivier, Eugène. L'Herbier de Moudon. Un recueil de recettes médicales de la fin du 14^{e} siècle. Notes sur la

botanique médicale au moyen-âge. 102 p., pl. (*Publications de la Société suisse d'histoire de la médecine et des sciences naturelles*, 11). Aarau, SAUERLÄNDER, 1938. ISIS

Fragments d'un herbier français écrit ou plutôt copié dans le pays de Vaud vers 1380, édités avec beaucoup de soin et d'intelligence. Il y a en tout 21 chapitres hétéroclites contenant 123 recettes; l'ouvrage entier était peut-être dix fois plus long. La flore représentée dans ces fragments est celle du pays, ou peut être un peu plus méridionale (il y a même une recette contre la piqûre du scorpion). La source principale est le *Macer floridus*, ou un texte dérivé; l'auteur primitif a utilisé d'autres sources ou sa propre expérience. G. S.

Aiken, Pauline. CHAUCER's *Legend of Cleopatra* and the *Speculum historiale*. *Speculum* 13, 232-36, 1938. ISIS

Ehrle, Franz (S. J.). Der Sentenzenkommentar PETERS VON CANDIA, des Pisaner Papstes ALEXANDERS V. Ein Beitrag zur Scheidung der Schulen in der Scholastik des vierzehnten Jahrhunderts und zur Geschichte des Wegestreites. IX+363 p. (*Franziskanische Studien*, Beiheft 9). Münster in Westf., ASCHENDORFF, 1925. ISIS

This is a very elaborate study of the life and writings of PETER OF CRETE, the Greek orphan, who became pope under the name of ALEXANDER V (1409-10). It includes a very detailed analysis of the spread of nominalism in Paris (1317) Prague (1348), Cologne (1389), Louvain (1425), Vienna (1365), Heidelberg (1386), Freiburg (1456), Basel (1460), Ingolstadt (1472), Tübingen (1477), Erfurt (1379), Leipzig (1409), Rostock (1419), Greifswald (1456), Wittenberg (1502), Cracaw (1364). The investigation is largely based upon archival documents some of which are edited. G. S.

Ruska, Julius. CHAUCER und das *Buch Senior*. *Anglia, Zeitschrift für Englische Philologie* 49, 136-37, 1937. ISIS

"Bei der Schilderung des Treibens der Alchemisten, die CHAUCER in *The canon's yeoman's tale* zum besten gibt, führt er auch ein Gespräch zwischen PLATO und einem seiner Schüler an, das durch das *Buch Senior* bezeugt werde. Eine Note in F. N. ROBINSONS Ausgabe vermerkt, dass unter dem *Buch Senior* das in ZETZNERS *Theatrum chemicum* Bd. 5, S. 191 ff. veröffentlichte Werk *Senioris Zadith Tabula chemica* zu verstehen sei; die Geschichte, die CHAUCER von PLATO erzähle, werde aber dort dem König SALOMO zugeschrieben. Herr Dr. HUGO LANGE, dem ich diesen Hinweis verdanke, hielt es für wünschenswert, dass den literarischen Zusammenhängen etwas genauer nachgeforscht werde, und ich entspreche gern seiner Anregung, nachdem vor einigen Jahren auch der arabische Urtext des *Buches Senior* zugänglich geworden ist."

XVth century (whole and first half)

Ullman, B. L. Manuscripts of NICHOLAS OF CUES. *Speculum* 13, 194-97, 1938. ISIS

Zinner, Ernst. Der astronomische Kalender von 1448. *Beiträge zur Inkunabelkunde* 2, 2 p., 1938. ISIS

Zoubov, V. Answer to query 62. JOANNES GAZULUS (*Isis* 25, 454). *Isis* 28, 92, 1938. ISIS

Zoubov, V. Question no. 72. Les sources de LEON BATISTA ALBERTI (1404-72) dans son traité : *De re aedificatoria* (q.v. *Isis* 26, 158-59). *Isis* 28, 93, 1938. ISIS

XVth century (second half)

Fontoura da Costa, A. La découverte du Brésil en 1500, 22 avril, date historique; 3 mai, date conventionelle. *Petrus Nonius* 1, 246-53, 1937. ISIS

Holcomb, Richard C. Who gave the world syphilis? The Haitian myth. With an introduction by C. S. BUTLER. 189 p. New York, Froben Press, 1937. ISIS

Reviewed by M. F. ASHLEY-MONTAGU, *Isis* 28, 101-02, 1938.

Robinson, Victor. The birth of syphilis. *Archives of dermatology and syphilology* 36, 325-30, 1937. ISIS

Van Andel, M. A. Het portret van Heer HENRIC VAN NAELDWIJC, een pathologisch document uit de middeleeuwen. *Bijdragen tot de geschiedenis der geneeskunde* 18, 37-40, 1 pl., 1938. ISIS

Zinner, Ernst. Die wissenschaftlichen Bestrebungen REGIOMONTANS. *Beiträge zur Inkunabelkunde* 2, 89-103, 2 fig., 1938. ISIS

XVIth century (whole and first half)

B. — *Physical sciences and technology*

Birkenmajer, Ludwig. NICOLAUS COPERNICUS und der deutsche Ritterorden. 39 p., facs. Krakau, Gesellschaft der Bücherfreunde, 1937. ISIS

Brunet, Pierre. Sur la nationalité de COPERNIC. *Archeion* 19, 371-73, 1937 (received April 1938). ISIS

Zinner, Ernst. Das Leben und Wirken des NIKOLAUS KOPPERNICK,

genannt COPPERNICUS. *Deutsches Museum, Abhandlungen und Berichte* 9, 147-70, 6 fig., 1937. ISIS

Zinner, Ernst. Neue Ergebnisse der KOPPERNICK-Forschung. *Forschungen und Fortschritte* 13, 369-70, 1937. ISIS

C. — *Natural sciences*

Baas, K. Ergänzungen zu EUCHARIUS RÖSSLINS Lebensgang. *Archiv für Gesch. d. Med.* 30, 317-18, 1938. ISIS

Destombes, Marcel. LOPO HOMEM's atlas of 1519. *Geographical journal* 90, 460-64, 1937. ISIS

" The writer seeks to show that the map of 1519 described by E. HEAWOOD in 1930, is a leaf from the atlas in the Bibliothèque Nationale known as the Miller Atlas, previously attributed to PEDRO and JORGE REINEL. The authenticity of this atlas has never been questioned. If the writer's conclusions are correct, not only must the LOPO HOMEM world-map of 1519 be accepted as genuine, but the Miller Atlas must be assigned to LOPO HOMEM, and not to the REINELS." C. W. A.

Kammerer, Albert. La Mer Rouge : L'Abyssinie et l'Arabie depuis l'antiquité. Tome II, Les guerres du Poivre—Les Portugais dans l'océan Indien et la mer rouge au XVI^e^ siècle—Histoire de la cartographie orientale. XVI+555 p. Le Caire, S. R. G. Égypte, 1935. ISIS

Reviewed by A. Z. C., *Geographical journal* 90, 371-73, 1937.

Pacheco Pereira, Duarte. Esmeraldo de situ orbis. Translated and edited by GEORGE H. T. KIMBLE. XXXVI+194 p. London, Hakluyt Society, 1937. ISIS

Reviewed by E. G. R. TAYLOR, *Geographical journal* 90, 385-86, 1937. " In 1505 he was entrusted with the task of writing a detailed roteiro for the information of shipmasters following the new sea-route to the East. Though incomplete, it is the only extant contemporary description of Africa as the Portuguese saw it in the opening years of the sixteenth century." See *Osiris* III, 88-102, 1937. C. W. A.

Titley, A. F. PARACELSUS, a résumé of some controversies. *Ambix* 1, 166-83, 2 pl., 1938. ISIS

Zweig, Stefan. MAGELLAN. Version française par ALZIR HELLA. XI+288 p., map. Paris, GRASSET, 1938 (30 fr.). ISIS

Très belle biographie, bien documentée, bien pensée et bien écrite. G. S.

D. — *Medical sciences*

Hase, Martin von. Erfurter medizinische Drucke aus der ersten Hälfte des 16. Jahrhunderts. *Archiv für Gesch. d. Med.* 30, 194-219, 10 fig., 1938. ISIS

Uhlig, P. Arzt und Apotheker in Altzwickau. Nach Protokollen und Konzeptbüchern des Rates bearbeitet. *Archiv für Gesch. d. Med.* 30, 301-06, 1938. ISIS

XVIth century (second half)

B. — *Physical sciences and technology*

Risner, Friedrich (d. 1580). RISNERI opticam cum annotationibus WILLEBRORDI SNELLII, edidit J. A. VOLLGRAFF. Pars prima, librum primum continens. 312 p. In aedibus Plantini, Gandavi (Ghent), 1918. ISIS

RISNER's *Optica* was first published by WILHELM WESSEL in Cassel 1606. The new edition restricted to the first book *(De visibili)* is here edited together with the notes of WILLEBRORD SNEL (1591-1626). G. S.

Ventura, Augusta Faria Gersão. O " Vespero " dos Lusíadas, III, 115 e a " Amorosa strella " de VI, 85. *Petrus Nonius* 1, 209-18, 1937. ISIS

C. — *Natural Sciences*

Houssaye, Noël de la. PIERRE BELON, du Mans, voyageur au Désert et précurseur de LOTI. *Les cahiers de radio-Paris* 9, 181-88, 1938. ISIS

Paoli, Umberto Giulio. CHRISTOBAL ACOSTA e le sue opere. *Archeion* 19, 317-46, 1937 (received April 1938). ISIS

Zaunick, Rudolph; Wein, Kurt. Ein Brief von JOHANNES THAL an LEONHART THURNEYSSER zum Thurn aus dem Jahre 1582 in rebus botanicis. *Archiv für Geschichte der Medizin und der Naturwissenschaften* 30, 401-06, 1938. ISIS

D. — *Medical sciences*

McDaniel, W. B., 2d. Notes on the " Tractatus de ossibus foetus " of VOLCHER COITER. *Annals of medical history* 10, 189-90, 1938. ISIS

Nardi, G. M. Il pensiero di GIROLAMO MERCURIALE sul veleno del cane rabbioso. *Rivista di storia delle scienze mediche e naturali* 29, 32-3, 1938. ISIS

Radbill, Samuel X. JOHN JONES, phisition, The second writer on pediatrics in English. *Bulletin of the institute of the history of medicine* 6, 145-62, 3 fig., 1938. ISIS

Willcox, Alice. Medical references in the dramas of JOHN LYLY. *Annals of medical history* 10, 117-26, 1938. ISIS

XVIIth century (whole and first half)

A. — *Mathematics*

Adam, Ch. DESCARTES, ses amitiés féminines. 161 p. Paris, BOIVIN, 1937. ISIS

Bortolotti, Ettore. Il metodo infinitesimale nell'opera geometrica di EVANGELISTA TORRICELLI. Atti del 1° congresso dell' unione matematica italiana, 19 p., 5 fig. (received April 1938). ISIS

Brunschvicg, L. DESCARTES. Paris, RIEDER, 1937. ISIS

De Donder, Th. Quelques réflexions sur le " Discours de la méthode." *Revue de l'Université de Bruxelles* 43, 142-54, 1937-38. ISIS

Gueroult, M. DESCARTES au Congrès Descartes. *Revue de méta. et de mor.* 45, 105-26, 1938. ISIS

Hofmann, Jos. E. Ueber die Quadraturen des ARTUS DE LIONNE. *National mathematics magazine* 12, 8 p., 4 fig., 1938. ISIS

Kubach, Fritz. JOHANNES KEPLER als Mathematiker. Veröffentlichungen der Badischen Sternwarte zu Heidelberg, 83 p., Karlsruhe 1935. ISIS

Reviewed by E. ZINNER, *Vierteljahrsschrift d. Astronomischen Gesellschaft* 72, 59, 1937.

Rey, Abel. DESCARTES : l'unité de la science. *Les cahiers de radio-Paris* 9, 118-23, 1938. ISIS

B. — *Physical sciences and technology*

Burke-Gaffney, W. (S. J.). KEPLER and the star of Bethlehem. *Journal of the royal astronomical society of Canada*, 417-25, Dec. 1937. ISIS

" The answers to the questions which this paper set out to consider would seem to be : 1. KEPLER wrote about the star of Bethlehem to compare it with his Nova of 1604, which appeared the day after a conjunction of Mars with Jupiter and was last seen two years later. 2. KEPLER suggested that the Star of Bethlehem was first seen by the Magi at the time of an apparent conjunction, of Jupiter and Saturn, — which he assigned to June 22, B.C. 7, and which PRITCHARD calculated to have occurred on May 29, B.C. 7. KEPLER further suggested that the Chaldeans had heard of a star that was to rise to herald a Messiah-king in Judea. The appearance of the star in 7 B.C. at the beginning of a series of conjunctions (not all seen, but known by calculation to occur) would have great meaning for the astrologically minded. According to KEPLER's chronology the star of the Magi was seen for the second time from Jerusalem about February B.C. 5. 3. That the star of Bethlehem might have been nothing more than the conjunction of planets, seems to have been first suggested by Bishop MÜNTER in 1821. 4. IDELER, in 1826, attributed MÜNTER's hypothesis to KEPLER. 5. No matter how close together two planets come, — even if one planet should be so close to another as to occult it partly, — wise men would not mistake them for a single star. A few nights' watching would show them separating, — as, also, they would have been seen to come together. In 7 B.C. Saturn and Jupiter were as close as twice the diameter of the moon. In 6 B.C., towards the end of February, Saturn, Mars and Jupiter formed a triangle in the sky; but Saturn and Mars, at least, were too close to the Sun to be seen by naked eye observers."

Loria, Gino. La collezione fiorentina dei " discepoli di GALILEO." *Archivio storico italiano* 2, 96-100, 1937. ISIS

Loria, Gino. GALILEO GALILEI ventiquattro tavole fuori testo. Seconda edizione aumentata. x+145 p., 24 pl. Milan, HOEPLI, 1938 (Lire 15). ISIS

Charming little book, beautifully illustrated, by the master historian GINO LORIA. G. S.

Zinner, E. Verschiedene Ausgaben von SCHILLERS *Coelum stellatum christianum*. *Vierteljahrsschrift der Astronomischen Gesellschaft* 72, 64-8, 1937. ISIS

D. — *Medical sciences*

Fabry von Hilden, Wilhelm. Von der Fürtrefflichkeit und Nutz

der Anatomie. Edited by F. DE QUERVAIN and H. BLOESCH. XVI+ 203 p. Leipzig, SAUERLÄNDER, 1936. ISIS

Reviewed by M. F. ASHLEY-MONTAGU, *Isis* 28, 102-03, 1938.

Gellner, G. BORBONIUS als Förderer der Egerer Wässer. *Archiv für Gesch. d. Med.* 30, 307-16, 1938. ISIS

Nixon, J. A. The East India company and the control of scurvy. *Proceedings of the Royal society of medicine* 31 (section of the history of medicine) 13-18, 1938. ISIS

"From 1601 onwards the East India company's ships carried a supply of oranges and lemons, or lemon juice, for the prevention of scurvy amongst their crews." "So far as I can ascertain, the man who was responsible for introducing the remedy to the Company's ships was Sir JAMES LANCASTER, who sailed as commander of the first fleet sent by the company to the East Indies in 1600."

Pagel, Walter. Religious motives in the medical biology of the seventeenth century. Reprint from the *Bulletin of the institute of the history of medecine* 3, 97-312, 1935. ISIS

Reviewed by JOSEPH NEEDHAM, *Isis* 28, 103-05, 1938.

E. — *Alia*

Gabrieli, Giuseppe. Il carteggio Linceo della vecchia accademia di FEDERICO CESI (1603-1630). Raccolto e pubblicato per cura di GIUSEPPE GABRIELI. Parte prima (anni 1603-1609). 120 p. Roma, BARDI, 1938. ISIS

Merton, Robert K. Science, technology and society in seventeenth century England. *Osiris* 4, 360-632, 1938. ISIS

Young, R. Fitzgibbon. I. The contemporary meaning of and associations of the term "invisible college" (1645-1662). Archiv pro badání o živ. a spisech J. A. KOMENSKÉHO ZVLÁŠTNÍ otisk ze sv. 14 (památce Stanislava Součka), p. 126-31, 1938. ISIS

XVIIth century (second half)

A. — *Mathematics*

Bateman, Harry. HALLEY's methods for solving equations. *American mathematical monthly* 45, 11-17, 1938. ISIS

Hiscock, W. G. DAVID GREGORY, ISAAC NEWTON and their circle. Extracts from DAVID GREGORY's memoranda, 1677-1708. x+48 p. Oxford, The editor, 1937. ISIS

Reviewed by JEAN PELSENEER, *Isis* 28, 105-06, 1938.

McColley, Grant. A facet from the life of NEWTON. *Isis* 28, 94, 1938. ISIS

C. — *Natural sciences*

Meier-Lemgo, Karl. ENGELBERT KÄMPFER : der erste deutsche Forschungsreisende, 1651-1716. 212 p. Stuttgart, STRECKER u. SCHRÖDER, 1937. ISIS

Reviewed by E. HEAWOOD, *Geographical journal* 90, 384-85, 1937.

Meyer, A. W. The discovery and earliest representations of spermatozoa. *Bulletin of the institute of the history of medicine* 6, 89-110, 11 fig., 1938. ISIS

Solla, Rüdiger. FRANCESCO REDI (1626-1697), der Naturforscher. *Archiv für Geschichte der Medizin und der Naturwissenschaften* 30, 352-63, 1938. ISIS

Taylor, E. G. R. ROBERT HOOKE and the cartographical projects of the late seventeenth century (1666-1696). *Geographical journal* 90, 529-40, 1937. ISIS

D. — *Medical sciences*

D'Esaguy, Augusto. ISAAC CARDOSO (1615-c.1680), doctor, philosopher and poet. *Bulletin of the institute of the history of medicine* 6, 163-70, 2 fig., 1938. ISIS

Irissou, Louis. A propos d'une lettre de VIEUSSENS. *Bulletin de la société française d'histoire de la médecine* 31, 310-15, 1937. ISIS

Mullett, Charles F. Sir WILLIAM PETTY on the plague. *Isis* 28, 18-25, 1938. ISIS

E. — *Alia*

McColley, Grant. MILTON's dialogue on astronomy : the principal immediate sources. *P.M.L.A.* 52, 728-62, 1937. ISIS

Russell, Bertrand. A critical exposition of the philosophy of LEIBNIZ : with an appendix of leading passages. XXIII+311 p. London, ALLEN and UNWIN, 1937. ISIS

Reviewed in *Nature* 141, 464, 1938. "Though a reprint of the first edition (1900), the present book contains a preface in which RUSSELL takes stock of Leibnizianism and points out where his own ideas now differ from those he held nearly forty years ago."

XVIIIth century (whole and first half)

B. — *Physical sciences and technology*

Heym, Gerard. An alchemical journal of the eighteenth century. *Ambix* 1, 197-99, 1 pl., 1938. ISIS

Apropos of *Der chymische Warsager*, Hamburg 1747-48. G. S.

Menshutkin, B. N. The works of M. V. LOMONOSOV on physics and chemistry. 538 p., 4 port., 1 pl., 59 fig. Moscow, Academy of Sciences, 1936 (in Russian). ISIS

Reviewed by A. P., *Isis* 28, 106-09, 1938.

Speter, Max. Vor zweihundert Jahren : "Halbautomatischer" Branntwein-Verkauf in London. *Zeitschr. f. Spiritus-industrie* Nr. 18, p. 133, 1938. ISIS

C. — *Natural sciences*

Brunelli, Bruno; Castaldi, L. Ancora su VALLISNIERI o VALLISNERI. *Rivista di storia delle scienze mediche e naturali* 29, 37-8, 1938. ISIS

Castaldi, L. VALLISNIERI o VALLISNERI? *Rivista di storia delle scienze mediche* 28, 306-08, 1937. ISIS

Koller, Armin Hajman. The Abbé DU BOS (1670-1742) : his advocacy of the theory of climate; a precursor of JOHANN GOTTFRIED HERDER. VI+128 p. Champaign, Ill., GARRARD Press, 1937. ISIS

Reviewed by A. A. M., *Geographical journal* 90, 573, 1937. An extreme determinist theory of the dependence of genius on climate. C. W. A.

Torlais, Jean. RÉAUMUR (1683-1757). Un esprit encyclopédique en

dehors de l'*Encyclopédie*. D'après des documents inédits. 448 p, frontispiece, facs., fig. Paris, DESCLÉE DE BROUWER, 1936.
ISIS

Reviewed by GEORGE SARTON, *Isis* 28, 112-15, 2 fig., 1938.

D. — *Medical sciences*

Gardner, Frances Tomlinson; Leake, C.D. BROWNE LANGRISH's letter on the usefulness of oleaginous warm baths. An example of eighteenth century medical confusion. *Annals of medical history* 10, 131-35, 1938. ISIS

Matzdorff, C. FRIEDRICH BRANDHORST. *Archiv für Gesch. d. Med.* 30, 247-65, 1938. ISIS

E. — *Alia*

Filliozat, Jean. Une grammaire sanscrite du XVIII[e] siècle et les débuts de l'indianisme en France. *Journal asiatique* 229, 275-84, 1937 (received May 1938). ISIS

XVIIIth century (second half)

B. — *Physical sciences and technology*

Galvani, Luigi. Il Taccuino. Riproduzione in fac-simile dell' autografo conservato nella Biblioteca dell' Archiginnasio di Bologna. A cura del comitato per la celebrazione del II centenario della nascita di L. GALVANI. XXV+41 p. Bologna, ZANICHELLI, 1937 (80 lire).
ISIS

Preface by ALBANO SORBELLI, followed by the facsimile, and a transcription of it. Incipit : Risultati d'alcuni esperimenti, 14 maggio 1795. The text is really very short, 30 very small pages. Elegant little book 149 × 103 mm. in a paper box, but terribly expensive. G. S.

McColley, Grant. The three editions of FILIPPO MORGHEN's *Raccolta*. *The art bulletin* 19, 112-18, 1 pl., 1937. ISIS

" Outstanding among the imaginary voyages to the moon which so delighted the seventeenth and eighteenth centuries is the pictorial account engraved by FILIPPO MORGHEN during the years immediately following 1764. Introducing this description is a decorated title page which shows the characters, CAVALIERE WILD SCULL and Signor DE LA HIRE, descending from their flying machine and meeting three inhabitants of the moon. Nine ornamented plates depicting bizarre scenes from the supposed life and economy of the

moon dwellers follow. These plates are unchanged in the various printings of the *Raccolta*, but the title page was altered on two occasions and is extant in three editions."

Speter, Max. ACHARD. Vom Bekanntwerden seiner Versuche von 1799 in Frankreich und in England. *Centralblatt für die Zuckerindustrie* 46, 4 p., 1938. ISIS

Speter, Max. Bibliographie von Zeitschriften-, Zeitungs-, Bücher-, Broschüren- u. dgl. Veröffentlichungen FRANZ CARL ACHARDS. Nach den Quellen neu zusammengestellt. *Die deutsche Zuckerindustrie* p. 315-18, 1938 (cont'd). ISIS

Speter, Max. GUILLAUME-WILHELM ACHARD (1716-1755), FRANZ CARL ACHARDS Vater! *Die Deutsche Zuckerindustrie* Nr. 19, 507-09, 1938. ISIS

Veen, H. MARTINUS VAN MARUM (20 Maart 1750-26 December 1837) en zijn beteekenis voor de geneeskunde. *Bijdragen tot de geschiedenis der geneeskunde* 18, 1-25, 2 illus., 1938. ISIS

Weeks, Mary Elvira. The chemical contributions of CHARLES HATCHETT. *Journal of chemical education* 15, 153-58, 1938. ISIS

Wright, C. E. The RUSSELLS of Birmingham. *British museum quarterly* 12, 18-20, 1938. ISIS

The RUSSELL papers recently acquired by the B. M. include seven letters from JOSEPH PRIESTLEY (1791-94) and one from his son. G. S.

C. — *Natural sciences*

Mackaness, George. Sir JOSEPH BANKS. His relations with Australia. XIV+146 p., 15 pl. Sydney, ANGUS & ROBERTSON, 1936. ISIS

Reviewed by CHARLES A. KOFOID, *Isis* 28, 116, 1938.

Martin, Thomas. An historic mantelpiece at the Royal Institution. *Nature* 141, 437-39, 1938. ISIS

Taken from the house of Sir JOSEPH BANKS, in Soho Square, London, recently demolished.

Nischer-Falkenhof, Ernst von. The survey by the Austrian general staff under the Empress MARIA THERESA and the Emperor JOSEPH II,

and the subsequent initial surveys of neighburing territories during the years 1749-1854. *Imago mundi* 2, 83-8, 1 pl., 1937. ISIS

D. — *Medical sciences*

Bayer, Friedrich Wilhelm. Reisen deutscher Aerzte ins Ausland (1750-1850). 73 p. (*Abhandlungen zur Geschichte der Medizin und der Naturwissenschaften*, H. 20). Berlin, EBERING, 1937. ISIS

Boldt, Arnold. Über die Stellung und Bedeutung der " Rapsodien über die Anwendung der psychischen Curmethode auf Geisteszerrüttungen " von JOHANN CHRISTIAN REIL (1759-1813) in der Geschichte der Psychiatrie. 120 p., 1 pl. (*Abhandlungen zur Geschichte der Medizin und der Naturwissenschaften*, H. 12). Berlin, EBERING, 1936. ISIS

Harris, Henry. Manchester's board of health in 1796. *Isis* 28, 26-37, 1938. ISIS

Hurd-Mead, Kate Campbell. " Old mother HUTTON," honor to Doctress HUTTON who first studied digitalis and its effect on the heart. *Medical life* 45, 20-22, 1938. ISIS

Jones, Harold Wellington. CHARLES BELL and the origin of his engravings of the arteries. *Medical life* 44, 371-80, port., 12 pl., 1937. ISIS

Krafka, Joseph, jr. The Tory doctors of Georgia under the banishment act of 1778. *Annals of medical history* 10, 127-30, 1938. ISIS

Luckhardt, Arno B. Official " edict " by the city of Zürich Switzerland, 1766 A. D. On the methods of resuscitation to be employed on drowned or asphyxiated persons. With a brief introduction. *Bulletin of the institute of the history of medicine* 6, 171-78, 1938. ISIS

Ransom, John E. JOHN HOWARD on quarantine. *Bulletin of the institute of the history of medicine* 6, 111-16, 1938. ISIS

Trout, Hugh H. The " Scotch-Irish " of the Valley of Virginia and

their influence on medical progress in America (conclusion). *Annals of medical history* 10, 162-68, 2 fig., 1938. ISIS

Weidekamp, Maria. Der Kurfürstlich-kölnische Leibarzt CHRISTOPH LUDWIG HOFFMANN. Sein Leben und sein Wirken in dem Hochstift Münster von 1764-1785. 99 p., 1 pl. (*Abhandlungen zur Geschichte der Medizin und der Naturwissenschaften*, H. 17). Berlin, EBERING, 1936. ISIS

E. — *Alia*

Birkenmajer, Aleksander; Kamykowski, Ludwik. La correspondance de JEAN ŚNIADECKI avec les savants français (1781-1798). *Organon*, publication de l'Institut Mianowski d'encouragement aux travaux scientifiques, vol. 2, 95-132, Varsovie, 1938. ISIS

Hornberger, Th. The effect of new science upon the thought of JONATHAN EDWARDS. *American literature*, May 1937. ISIS

Ramsauer, Rembert. JUNG-STILLING (1740-1817) als Naturforscher. *Archiv für Gesch. d. Med.* 30, 282-94, 1938. ISIS

Shoemaker, Ervin C. NOAH WEBSTER, pioneer of learning. New-York, Columbia University Press, 1936. ISIS

Reviewed by ROBERT ULICH, *Isis* 28, 110-12, 1938.

XIXth century (whole and first half)

B. — *Physical sciences and technology*

Centenary of the Atlantic steam ferry. *Nature* 141, 540-41, 1938. ISIS

Daguerre commémoré à Cormeilles-en-Parisis. *L'Illustration* 95, p. 345, 1937. ISIS

Dony-Hénault, Oct. A propos de la découverte de la métallurgie thermique du zinc en Belgique au début du XIX^{e} siècle. *Acad. r. de Belg., Bull. de la cl. des sc.* 24, 84-7, 1938. ISIS

Robinson, Victor. Coal-tar contemplations. *Scientific monthly* 45, 354-56, 1937. ISIS

Speter, Max. Nachwort zur " Klärung der Multiplikator-Prioritätsfrage Schweigger-Poggendorff." *Zeitschrift für Instrumentenkunde* 58, 163-67, 4 fig., 1938. ISIS

Testi, Gino. L'opera scientifica e patriottica di RICCARDO TUPPUTI chimico Pugliese (1788-1836). *Rivista di storia delle scienze mediche e naturali* 29, 33-6, 1938. ISIS

Verschaffelt, Jules. JOSEPH PLATEAU. *Wetenschap in Vlaanderen* 2, 12-13, 1936. ISIS

C. — *Natural sciences*

Martin, Lawrence. The log of PALMER's discovery of Antarctica. *Science* 87, 165, 1938. ISIS

" Antarctica, fifth in size among the seven continents, both Australia and Europe being smaller, was discovered on Saturday, November 18, 1920, by Captain NATHANIEL BROWN PALMER, of Stonington, Conn. The hour was 4 A. M."

Peattie, Donald Culross. Singing in the wilderness. A salute to JOHN JAMES AUDUBON. XV+245 p., pls. New York, PUTNAM, 1935. ISIS

This is not a biography of AUDUBON, but a very sensitive and imaginative portrait of him, by a man who is a good naturalist as well as an artist. G. S.

Pennell, Francis W. Travels and scientific collections of THOMAS NUTTALL. *Bartonia*, proceedings of the Philadelphia botanical club, no. 18, 64 p., 6 pl., 2 fig., 1936. ISIS

Reviewed by C. A. KOFOID, *Isis* 28, 116-18, 1938.

Schlueter, Robert E. FREDERICK ADOLPHUS WISLIZENUS (1810-1889), pioneer meteorologist, physician and natural scientist. *Isis* 28, 38-52, 8 fig., 1938. ISIS

Studnička, F. K. JAN EV. PURKYNĚ et la théorie cellulaire. In memoriam JOH. EV. PURKYNĚ, 1787-1937, p. 66-75, Prague, GRÉGR, 1937. ISIS

Contents : 1. La découverte des cellules animales (notamment des cellules à noyaux) est due principalement à P. et à ses disciples; 2. P. caractérisa les cellules animales de façon tout à fait juste comme " granules "; 3. P. fut le premier à employer le nom " protoplasma "; 4. P. fut le premier à

signaler, en s'appuyant sur des faits, l'analogie entre les constituants élémentaires des corps végétaux et les constituants élémentaires des corps animaux; 5. P. avait très bien compris la différence entre les cellules végétales et les cellules animales. " Nous tenons à attirer l'attention des milieux scientifiques sur le fait qu'au mois de septembre 1937 (19. IX) il y aura juste cent ans que JAN EV. PURKYNĚ exposa pour la première fois l'idée fondamentale — qui était aussi l'idée vraie — de la célèbre ' théorie cellulaire '."

D. — *Medical sciences*

Armbrecht, Edward C. HULLIHEN, the oral surgeon. *International journal of orthodontia and oral surgery* 23, p. 377, p. 511, p. 598, p. 711, 1937. ISIS

Buttersack, Felix. Zur Erinnerung an J. L. ALIBERT. *Archiv für Gesch. d. Med.* 30, 279-81, 1938. ISIS

Erichsen, Franz Christian. MARTIN WILHELM MANDT, 1799-1858. 183 p., 1 pl. (*Abhandlungen zur Geschichte der Medizin und der Naturwissenschaften*, H. 10). Berlin, EBERING, 1936. ISIS

Frost, W. H. SNOW on cholera, being a reprint of two papers by JOHN SNOW, M. D., together with a biographical memoir by B. W. RICHARDSON and introduction by WADE HAMPTON FROST. XLVIII+VII+191 p., 2 maps. New York, Commonwealth fund, 1936. ISIS

Reviewed by CHARLES A. KOFOID, *Isis* 28, 122, 1938.

Lehmann, Heinz. Die Krankheits- und Heilungslehre des meiningischen Hofmedicus FERDINAND JAHN. Ein Beitrag zur Kenntnis der naturhistorischen Schule in der Medizin. 58 p. (*Abhandlungen zur Geschichte der Medizin und der Naturwissenschaften*, H. 14). Berlin, EBERING, 1936. ISIS

Noorden, Werner von. CHRISTIAN FRIEDRICH NASSE, ein Vorkämpfer und Wegbereiter des deutschen Arzttums. Auf Grund ungedruckter Briefe, Dokumente und des Nachlasses dargestellt. 424 p., 8 pl. (*Abhandlungen zur Geschichte der Medizin und der Naturwissenschaften*, H. 13). Berlin, EBERING, 1936. ISIS

E. — *Alia*

Ducassé, Pierre. De l'Encyclopédie à AUGUSTE COMTE. *Les cahiers de radio-Paris*, 9, 124-30, 1938. ISIS

La Harpe, Jean de. De l'ordre et du hasard. Le réalisme critique d'ANTOINE AUGUSTIN COURNOT. Préface d'ARNOLD RAYMOND. XXIV+377 p. (Mémoires de l'Université de Neuchatel, 9). Neuchatel, Secrétariat de l'Université, 1936 (60 frs.). ISIS

XIXth century (second half)

A. — *Mathematics*

Godeaux, Lucien. Notice sur FRANÇOIS DERUYTS (1864-1902). *Annuaire de l'Acad. royale de Belgique* 114, 85-102, 1938. ISIS

B. — *Physical sciences and technology*

Costanzo, Giovanni. GUGLIELMO MARCONI. *Petrus Nonius* 1, 292-318, 1937. ISIS

George, André. Lord RUTHERFORD ou l'alchimiste. *La revue de France* 525-33, 1938. ISIS

Maxwell, James Clerk. Origins of CLERK MAXWELL's electric ideas as described in familiar letters to WILLIAM THOMSON. 56 p. Cambridge, University Press, 1937. ISIS

Reviewed by G. R. GOLDSBROUGH, *Mathematical gazette* 21, 442-43, 1937.

Parsons, Sir Charles. The scientific activities of. *Nature* 141, 185-87, 4 fig., 1938. ISIS

Picard, Émile. L'évolution des idées sur la lumière et l'œuvre d'ALBERT MICHELSON. Lecture faite en la séance annuelle du 16 décembre 1935. 35 p., port. (Institut de France, Académie des sciences). Paris, GAUTHIER-VILLARS, 1935. ISIS

Picard, Émile. La vie et l'œuvre de PAUL VILLARD et de GEORGES GOUY. Lecture faite en la séance annuelle du 20 Décembre 1937. 29 p., 2 port. (Institut de France, Académie des sciences). Paris, GAUTHIER-VILLARS, 1937. ISIS

Stas, Jean Servais (1813-1891). Note apropos of the salle JEAN STAS in the University of Brussels, by G.S. *Isis* 28, 95, 1938. ISIS

Stas, Jean Servais (1813-91). De la préparation de l'or pur. *Bulletin de la société chimique de Belgique* 46, 377-79, 1937. ISIS

C. — *Natural sciences*

Fernald, Evelyn I. Preliminary report of a study of the plants of Winnebago county, Illinois. *Illinois state academy of science* 28, p. 89, 1935. ISIS

Apropos of MICHAEL S. BEBB (1833-95).

Foran, W. Robert. African Odyssey : the life of VERNEY LOVETT-CAMERON. 390 p. London, HUTCHINSON, 1937. ISIS

Reviewed by E. HEAWOOD, *Geographical journal* 90, 573-74, 1937.

Pfeifer, Gottfried. Die räumliche Gliederung der Landwirtschaft im nördlichen Kalifornien. *Wiss. Veröffentl. Ges. Erdkunde*, Leipzig 10, 1-325, 27 maps, 40 figs., 1936. ISIS

This monograph traces the history of agriculture in the north central valley of California through the transition period (1850-1870) from the pastoral conditions of the Spanish regime through that of the completion of the American occupation during which the native flora was replaced by wheat fields and the fauna by cattle and sheep. The second period is the current one during which irrigation has turned semi-arid lands into orchards, vineyards, meadows of alfalfa, and truck gardens. It is a historical analysis of the many scientific and social factors operating in this profound and striking transformation. C. A. K.

Prenant, Marcel. DARWIN. 320 p. Paris, Éditions sociales internationales, 1938. ISIS

Wichler, Gerhard. ALFRED RUSSEL WALLACE (1823-1913), sein Leben, seine Arbeiten, sein Wesen. Zugleich ein Beitrag zu dem Verhältnis von WALLACE zu DARWIN. *Archiv für Geschichte der Medizin und der Naturwissenschaften* 30, 364-400, 1938. ISIS

D. — *Medical sciences*

Billings, John Shaw (1838-). JOHN SHAW BILLINGS memorial number. *Bulletin of the institute of the history of medicine* 6, 223-386, 1938. ISIS

Contents : Introduction, by HENRY E. SIGERIST; J. S. B. as an army medical officer. A tribute on his hundredth birthday, April 12, 1938, by EDGAR ERSKINE HUME; J. S. B. and the Johns Hopkins Medical School; a tribute on the one hundredth anniversary of his birth, by ALAN M. CHESNEY; Two papers by J. S. B. on medical education. With a foreword by ALAN M. CHESNEY; J. S. B. and the history of medicine, by SANFORD V. LARKEY; J. S. B. and the New York Public Library, by H. M. LYDENBERG.

Helmholtz, Hermann von. On thought in medicine (Das Denken in der Medizin). Introduction by ARNO B. LUCKHARDT. *Bulletin of the institute of the history of medicine* 6, 117-43, 1 pl., 1938. ISIS

McGuire, Stuart. HUNTER HOLMES MCGUIRE, M. D., LL. D. *Annals of medical history* 10, 1-14, 6 fig., 136-61, 4 fig., 1938. ISIS

(Nightingale, Florence). Catalogue of the FLORENCE NIGHTINGALE collection. Anna C. Maxwell Hall, Presbyterian hospital School of nursing. 30 p. 1937. ISIS

" In May, 1932, Dr. HUGH AUCHINCLOSS presented to the School of nursing a large collection of FLORENCE NIGHTINGALE's letters and other writings, which he had collected over a period of years. The collection was given to the school in memory of his mother, MARIA SLOAN AUCHINCLOSS, on the graduation of his daughter, MARIA, from the Presbyterian hospital School of nursing. A small room off the South library was reserved at this time in which to keep these treasures, along with some NIGHTINGALE pictures and portraits collected by Miss MAXWELL. From time to time additions have been made to the original by Dr. AUCHINCLOSS and his brothers, Mr. REGINALD and Mr. CHARLES AUCHINCLOSS. At the present time there are 67 letters, 12 books, 20 pictures and other NIGHTINGALE memorabilia."

Ramón y Cajal, Santiago (1852-1934). Recollections of my life. Translated by E. HORNE CRAIGIE with the assistance of JUAN CANO. XI+638 p. (*Memoirs of the American philosophical society*, 8). Philadelphia, May 1937. ISIS

Reviewed by GEORGE SARTON, *Isis* 28, 118-22, 1938.

Seipel, Carl M.; Hammar, J. August. An English translation of SANDSTRÖM's *Glandulae parathyreoideae*. With biographical notes by J. AUGUST HAMMAR. *Bulletin of the institute of the history of medicine* 6, 179-222, 4 pl., 1938. ISIS

E. — *Alia*

Boutroux, Pierre (1880-1922). L'œuvre de PAUL TANNERY. *Osiris* 4, 690-705, 1938. ISIS

Unpublished lecture published with a preface and a bibliography by G. SARTON.

Levi della Vida, G. Le père HENRI LAMMENS (1862-1937). *Byzantion* 12, 701-08, 1937. ISIS

Pearl, Raymond. KARL PEARSON, 1857-1936. *Journal of the American statistical association* 31, 653-64, 1936. ISIS

Tannery, Paul (1843-1904). Biographie et portrait. *Osiris* 4, 633-89, 1938 (the whole volume is dedicated to his memory). ISIS

Thorndike, Lynn. CHARLES HOMER HASKINS (1870-1937). *Isis* 28, 53-6, plate, 1938. ISIS

XXth century

A. — *Mathematics*

Macaulay, Francis Sowerby (1862-1937). Obituary by H. F. BAKER and J. E. LITTLEWOOD. *Obituary notices of fellows of the Royal Society* 2, 357-61, 1938. ISIS

Portrait and bibliography.

Padoa, Alessandro. (-1937). Obituary by GINO LORIA, R. Università degli studi di Genova, 6 p., port., 1938. ISIS

Elliott, Edwin Bailey (1851-1937). Obituary by H. W. TURNBULL. *Obituary notices of fellows of the Royal Society* 2, 425-31, 1938. ISIS

Portrait and bibliography.

B. — *Physical sciences and technology*

Forbes, George (1849-1936). Obituary by J. A. FLEMING and D'ARCY W. THOMPSON. *Obituary notices of fellows of the Royal Society* 2, 283-86, 1938. ISIS

Portrait and bibliography.

Geiger, H. Memories of RUTHERFORD in Manchester. *Nature* 141, 244, 1938. ISIS

Holden, Sir Henry Capel Lofft (1856-1937). Obituary by E. N. DA C. ANDRADE. *Obituary notices of fellows of the Royal Society* 2, 367-69, 1938. ISIS

Portrait.

Jackson, Sir Herbert (1863-1936). Obituary by H. MOORE. *Obituary notices of fellows of the Royal Society* 2, 307-14, 1938. ISIS

Portrait.

Kennedy, Sir Alexander Blackie William (1847-1928). Obituary by ALEXANDER GIBB. *Obituary notices of fellows of the Royal Society* 2, 213-23, 1938. ISIS

Portrait.

Le Chatelier, Henry Louis (1850-1936). Obituary by C. H. DESCH. *Obituary notices of fellows of the Royal Society* 2, 251-59, 1938. ISIS

Portrait.

Lowry, Thomas Martin (1874-1936). Obituary by W. J. POPE. *Obituary notices of fellows of the Royal Society* 2, 287-93, 1938. ISIS

Portrait.

Mather, Thomas (1856-1937). Obituary by W. E. SUMPNER. *Obituary notices of fellows of the Royal Society* 2, 381-84, 1938. ISIS

Portrait.

Robb, Alfred Arthur (1873-1936). Obituary by JOSEPH LARMOR. *Obituary notices of fellows of the Royal Society* 2, 315-21, 1938. ISIS

Portrait.

Rutherford, Lord (1871-1937). Obituary by A. S. EVE and J. CHADWICK. *Obituary notices of fellows of the Royal Society* 2, 395-423, 1938. ISIS

Portrait.

Taylor, William (1865-1937). Obituary by F. TWYMAN. *Obituary notices of fellows of the Royal Society* 2, 363-65, 1938. ISIS

Portrait.

Young, Sydney (1857-1937). Obituary by W. R. G. ATKINS. *Obituary notices of fellows of the Royal Society* 2, 371-79, 1938. ISIS

Portrait and bibliography.

C. — *Natural sciences*

Key, Charles E. The story of twentieth-century exploration. 286 p. London, HARRAP, 1937. ISIS

Reviewed by J. M. SCOTT, *Geographical journal* 90, 576, 1937.

Krogh, August. Visual thinking. An autobiographical note. *Organon* 2, 87-94, 1938. ISIS

Maxwell, Sir Herbert Eustace (1845-1937). Obituary by WILLIAM WRIGHT SMITH. *Obituary notices of fellows of the Royal Society* 2, 387-93, 1938. ISIS

Portrait.

Mitchell, Sir Peter Chalmers. My fill of days. 440 p. London, FABER and FABER, 1937 (15/). ISIS

The careers of most zoologists are those of research and teaching. That of this autobiographer was one of research and public service in journalism and in administration as Secretary of the world famous Zoological Gardens of the Zoological Society of London for the period 1903 to 1935, when he was succeeded by JULIAN HUXLEY. These memoirs relate the life story of a Scotch lad of a famous family, a student at Oxford, who after extension lecturing, teaching in Charing Cross Hospital Medical School and London Hospital Medical School became secretary of the Zoological Society, his life work. In the meantime his varied literary work as reviewer and critic had included *A biological view of our foreign policy* in which is found the view of international competition later propounded by BERNHARDI in his *England as Germany's vassal.* The biological portions of the tenth and eleventh editions of the *Encyclopaedia Britannica* were edited by him. Later as contributor in scientific fields and writer of editorial leaders in the London *Times* he used his varied talents and knowledge of science in giving general information and in influence on public affairs.

His administrative skill was seen in the development of much needed extensions and improvements in the Gardens, in widening the scope of its educational features and its publications, increasing its scientific staff, and fostering the cooperative aspects of its bibliographic service in the *Zoological Record.*

The volume is enriched with anecdote and comment on leaders in European biology of the past generation, including such interesting characters as BASTIAN, BATESON, BATHER, BOULENGER, BURDON-SANDERSON, DARWIN, EWART, HILL, HUXLEY, KEITH, LANKESTER, METCHNIKOFF, MINCHIN, MOSELEY, JOHN MURRAY, ELLIOT SMITH, WALLACE, and WEISMAN.

C. A. K.

Oulié, Marthe. JEAN CHARCOT (1867-1936); préface de PAUL CHACK. Cinquième édition. IV+242 p., frontispiece. Paris, GALLIMARD, 1937 (21 fr.). ISIS

Qui est le grand CHARCOT ? Au début de ce siècle, la réponse à cette question eut été facile, car il n'y avait qu'un CHARCOT, JEAN MARTIN CHARCOT de la Salpétrière (1825-93), le grand rénovateur de la pathologie nerveuse. Aujourd'hui on pourrait hésiter; tout au moins j'hésiterais car JEAN (JEAN BAPTISTE), l'explorateur polaire, s'il est peut-être moins fameux que son père, est peut-être plus grand. JEAN fut d'abord médecin et l'assistant de son père, mais tout jeune il rêva de la mer et ce rêve orienta sa vie. Comme le remarque l'auteur (p. 88) : " En somme, il n'y a peut-être que deux catégories d'humains, ceux chez qui les rêves d'enfance sont assez puissants pour se réaliser dans la maturité, et ceux qui, n'ayant rien rêvé ou pas assez

voulu, sont ballotés par les circonstances. Pour les êtres d'élite, les circonstances n'existent pas. Ils les créent." Cette biographie est bien documentée et l'auteur, élève de Sévigné et louve de mer émérite, était bien qualifiée pour nous l'écrire. Elle nous donne un excellent portrait de JEAN CHARCOT, et sans rien déguiser nous le rend fort aimable. Par exemple, elle nous décrit sa pitié franciscaine pour les animaux. Son naufrage sur la côte d'Islande en septembre 1936 fut pour lui, une mort aussi désirable qu'héroïque, mais hélas ! pour le reste de l'équipage ce fut une terrible catastrophe.

Les œuvres de CHARCOT sont presque toutes des descriptions de ses explorations polaires, mais l'une d'elles intéresse les historiens de la science " CHRISTOPHE COLOMB vu par un marin " (Paris 1928; *Isis* 13, 165); c'est une discussion technique des navigations de COLOMB. G. S.

Parks, William Arthur (1868-1936). Obituary by O. T. JONES. *Obituary notices of fellows of the Royal Society* 2, 261-63, port., 1938. ISIS

Rothschild, Lord (1868-1937). Obituary by KARL JORDAN. *Obituary notices of fellows of the Royal Society* 2, 385-86, port., 1938. ISIS

Seaver, George. EDWARD WILSON of the Antarctic. XXXIV+301 p. New York, DUTTON, 1937 ($3.00). ISIS

The life of EDWARD WILSON (1872-1912) who accompanied SCOTT on the tragic expedition to the South Pole is now for the first time presented to the public. Doctor, geologist, ornithologist, and artist to the expedition, WILSON proved himself the most remarkable personality of the group. A deeply religious man, through all the terrible vicissitudes of the expedition to the last, WILSON never once faltered in his duty nor once is known to have thought of himself, being always at the service of others. He earned the admiration and the love of all who knew him, and it is fitting that his noble life and death should be commemorated in this volume, which is appropriately introduced by a surviving member of the expedition, APSLEY CHERRY-GARRARD. The volume is excellently illustrated, many of the illustrations being from WILSON's own hand. M. F. A.-M.

Smith, Bernard (1881-1936). Obituary by W. G. FEARNSIDES. *Obituary notices of fellows of the Royal Society* 2, 239-49, port., 1938. ISIS

Smith, Sir Grafton Elliot (1871-1937). Obituary by J. T. WILSON. *Obituary notices of fellows of the Royal Society* 2, 323-33, port., 1938. ISIS

Sollas, William Johnson (1849-1936). Obituary by A. SMITH WOODWARD and W. W. WATTS. *Obituary notices of fellows of the Royal Society* 2, 265-81, 1938. ISIS

Portrait and bibliography.

Tillyard, Robin John (1881-1937). Obituary by A. D. IMMS. *Obituary notices of fellows of the Royal Society* 2, 339-45, port., 1938. ISIS

Weber, Max Wilhelm Carl (1852-1937). Obituary by D'ARCY WENTWORTH THOMPSON. *Obituary notices of fellows of the Royal Society* 2, 347-55, 1938. ISIS

Portrait and bibliography.

D. — *Medical sciences*

Cash, John Theodore (1854-1936). Obituary by C. R. MARSHALL. *Obituary notices of fellows of the Royal Society* 2, 295-300, 1938. ISIS

Portrait and bibliography.

Garrod, Archibald Edward (1857-1936). Obituary by F. G. HOPKINS. *Obituary notices of fellows of the Royal Society* 2, 225-28, port., 1938. ISIS

Kettle, Edgar Hartley (1882-1936). Obituary by JAMES A. MURRAY. *Obituary notices of fellows of the Royal Society* 2, 301-05, port., 1938. ISIS

MacWilliam, John Alexander (1857-1937). Obituary by A. KEITH. *Obituary notices of fellows of the Royal Society* 2, 335-38, port., 1938. ISIS

Riesman, David. High blood pressure and longevity, and other essays selected from the published writings. XII+726 p., frontispiece. Philadelphia, WINSTON, 1937. ISIS

Volume published by subscription of friends and admirers to celebrate the author's seventieth birthday on March 27, 1937. Most of the papers are medical but quite a few are historical and general (p. 493-707), too many to be enumerated here. There is also a complete bibliography and portrait. G. S.

Turner, G. Grey. What research owes to the PAGET tradition. *The fight against disease* 25, 33-41, 52-8, 1937. ISIS

The work of Sir JAMES PAGET (1814-1899) and STEPHEN PAGET (1855-1926). C. W. A.

Wellcombe, Henry Solomon (1853-1936). Obituary by C. M. WENYON. *Obituary notices of fellows of the Royal Society* 2, 229-38, port., 1938. ISIS

E. — *Alia*

Ducassé, Pierre. La vie et l'œuvre de Madame Paul Tannery. *Osiris* 4, 706-09, 1938. ISIS

PART II

HISTORICAL AND ETHNOGRAPHICAL CLASSIFICATION

I. — ANTIQUITY

1. — ANTIQUITY (*generalities*)

Baumann, E. D. Die Katalepsie der Antiken. *Janus* 42, 7-24, 1938. ISIS

Diepgen, Paul. Die Frauenheilkunde der alten Welt (W. Stoeckel, *Handbuch der Gynäkologie* 12. Bd. 1. Teil). 348 p., 64 fig. München, Bergmann, 1937. ISIS

Reviewed by Aubrey Diller. *Isis* 28, 123-26, 1938.

2. — EGYPT

Bloom, A. La lèpre dans l'ancienne Égypte et chez les anciens Hébreux. La lèpre dans la Bible. XVI+66 p. (Communication faite au congrès international de la lèpre au Caire, mars 1938). ISIS

Analyse détaillée d'où il ressort : " 1° que les deux facteurs hébraïques — sortie des anciens Hébreux de l'Égypte, et *tsaraat* biblique — invoquées pour démontrer l'existence de la lèpre dans l'ancienne Égypte, donnent un résultat nettement contraire à cette assertion. Car, *a*) la sortie des Hébreux de l'Égypte n'était pas due à la lèpre; et *b*) la *tsaraat* biblique n'est pas la lèpre; 2° que les preuves historiques invoquées dans ce but, étant précisément basées sur le récit de la sortie des Hébreux de l'Égypte, il est donc évident qu'elles ne confirment pas cette existence puisque ce récit n'avait rien à voir avec la lèpre; 3° que les preuves archéologiques en notre possession à ce jour sont absolument muettes quant à l'existence de la lèpre dans l'ancienne Égypte. Et nous sommes amenés à la conclusion générale suivante : Rien ne justifie et rien n'autorise d'affirmer que la lèpre existait en Égypte à une époque antérieure à Alexandre le Grand."

Cumont, Franz. L'Égypte des astrologues. 254 p. Bruxelles, Fondation égyptologique Reine Elisabeth, 1937. ISIS

Admirable mise au point de toutes les connaissances relatives à l'Égypte

hellénistique qui peuvent se déduire des textes astrologiques, et en particulier de la compilation astrologique qui a été découverte par WILHELM GUNDEL, en traduction latine dans un unique ms. de la Renaissace, et publiée par lui en 1936. Il ne s'agit guère d'astrologie mais, comme le dit fort bien le titre, de l'Égypte des astrologues. La documentation abondante de l'auteur a été encore enrichie par les notes de Mlle. CLAIRE PRÉAUX, dérivées des papyrus grecs. G. S.

Ebbell, B. The papyrus Ebers. The greatest Egyptian medical documents. Translated by B. EBBELL. 135 p. Copenhagen, LEVIN & MUNKSGAARD, 1937. ISIS

Reviewed by OWSEI TEMKIN, *Isis* 28, 126-31, 1938.

Farnsworth, Marie, Ritchie, Patrick D. Spectographic studies on ancient glass, Egyptian glass, mainly of the eighteenth dynasty, with special reference to its cobalt content. *Technical studies* 6, 155-68, 1938. ISIS

Fî Miṣr al-Islāmiyya (In Islamic Egypt). *Al-Muqtaṭaf*, Cairo 1937 (176 p., illustr., in Arabic). ISIS

Series of lectures dealing with Egyptian culture in the Middle Ages. This is a sequel to the work *Turâth Miṣr al-qadîma* (1936), dealing with the Pharaonic period. G. S.

Lucas, A. Were the Giza pyramids painted? *Antiquity* 12, 26-30, 1938. ISIS

Turâth Miṣr al-qadîma (The legacy of ancient Egypt). *Al-Muqtaṭaf*, Cairo 1936 (138 p. illust., in Arabic). ISIS

The division of extension of the American University in Cairo, Egypt, with the cooperation of the Papyrus society of Cairo conducted a series of 9 lectures on the general subject " Legacy of ancient Egypt," early in 1936. This series of lectures was given in memory of the late Prof. JAMES H. BREASTED whose work and researches in the history of ancient Egypt, are greatly appreciated by both Egyptians and foreigners.

The *Al-Muktaṭaf* magazine, the well-known Arabic scientific monthly of Cairo, agreed to print these lectures in book form. To complete the book, two chapters were written and added to the material of lectures as well as a lecture on the importance of the mathematics of ancient Egypt which was given by L.C. KARPINSKI of the University of Michigan, when he was in Cairo, in 1934. G. S.

3. — BABYLONIA AND ASSYRIA

Gandz, Solomon. The origin and development of the quadratic equations in Babylonian, Greek, and early Arabic algebra. *Osiris* 3, 405-557, 1937 (publication delayed until March 1938). ISIS

" Originally, I had started out in this my work to make a study of the Babylonian and Greek *influence* upon Arabic algebra. My aim was to determine the character of the first Arabic algebra and to ascertain whether it is to be regarded as the continuation of Greek thought or as the representation of the old Babylonian legacy in mathematics. But while thus taking up the study of Babylonian algebra, I found there so many difficulties and perplexities calling for a new explanation and elucidation, that I was compelled to deviate from the usual conceptions and theories and to advance a new theory of my own, giving a new interpretation of the ways and methods of the old Babylonian schools. Thirty examples, many of them containing whole documents or groups of problems, have been quoted and analyzed, in this paper, to illustrate the necessity of this new interpretation." " EUCLID in his *Elements* and DIOPHANTUS in his *Arithmetica* still preserve the ancient Babylonian types and methods. AL-KHUWĀRIZMĪ's place in the history of mathematics has been characterized by his consistent rejection of these brilliant but antiquated methods and by the introduction of the modern types and methods. Both, however, Greek and Arabic algebra are built upon the rock of the old Babylonian science and wisdom. It is the legacy of the old Babylonian schools which remains the very foundation and cornerstone of both the Greek and Arabic systems of algebra. The origin and early development of the science cannot be understood without the knowledge of this old Babylonian legacy."

Neugebauer, O. Untersuchungen zur antiken Astronomie III. Die babylonische Theorie der Breitenbewegung des Mondes. *Quellen und Studien zur Geschichte der Mathematik, Astronomie und Physik*, Abtg. B : Studien 4, 193-346, figs., 1938. ISIS

4. — GREECE

Eckels, Richard Preston. Greek wolf-lore. 88 p. Philadelphia, University of Pennsylvania, 1937. ISIS

" The wolf holds an arbitrary position in the folklore of European civilization. As the wild animal most widely feared, whether justly or not, he becomes the embodiment of all that is hostile, malignant, and terrible in the natural world. He is the vehicle of an unconscious abstraction which we may call the Baleful Beast. As such he mirrors the darker side of human thought, the more grim and gruesome elaborations of human imagination. In a sense, then the present study has plumbed the lowest depths of the Greek mind of the classical and post-classical periods. Surveying our findings, we may well be gratified to discover that the Greeks, even at their worst, were infinitely more wholesome and sensible, even in their ignorance, than, for example, the Romans of the Empire or the Germans of the Reformation period." Contents : 1. The wolf in Greek zoölogy; 2. Greek superstitions of the wolf and something of their later history; 3. The werwolf and " Lycanthropy "; 4. The wolf in Greek religion; 5. The wolf-nurse; Index locorum; Index nominum.

Gossen, Hans. Die Tiere bei den griechischen Lyrikern. *Archiv*

für Geschichte der Medizin und der Naturwissenschaften 30, 321-51, 1938. ISIS

Kaeppel, C. Off the beaten tract in the classics. 148 p. Melbourne, University Press, 1936. ISIS

Reviewed by T. C. W., *Geography* 22, 234, 1937. Essays on HANNO, the *Periplus*, PYTHEAS, etc. C. W. A.

II. — MIDDLE AGES

6. — MIDDLE AGES (*generalities*)

Birkenmajer, Aleksander. Silesian astronomy and astrology during the Middle ages. 40 p. Wydawnictwa instytutu sląskiego, Katowice 1937 (in Polish). ISIS

Carmody, Francis J. *De bestiis et aliis rebus* and the Latin *Physiologus*. *Speculum* 13, 153-59, 1938. ISIS

Dobiash-Rozhdestvenskaya, N. A.; Burski, M. I. Agriculture in western mediaeval records. Translations and commentaries. XII+364 p., 69 fig. (Publications of the institute of the hist. of science and technol., 5th series, history of agriculture, 1st issue). Moscow, Academy of Sciences U.S.S.R., 1936 (in Russian). ISIS

Reviewed by A. P., *Isis* 28, 131-34, 1938.

Egert, Ferdinand Paul. Gynäkologische Fragmente aus dem frühen Mittelalter. Nach einer Petersburger Handschrift aus dem VIII.-IX. Jahrhundert. Zum ersten Mal gedruckt. 59 p. (*Abhandlungen zur Geschichte der Medizin und der Naturwissenschaften*, H. 11). Berlin, EBERING, 1936. ISIS

Jones, Charles W. Two Easter tables. *Speculum* 13, 204-05, 1938. ISIS

Kamal, Youssouf. Hallucinations scientifiques (Les portulans). 93 p., 39 pl. Leiden, BRILL, 1937 ("Non mis dans le commerce.") ISIS

Reviewed by DANA B. DURAND, *Isis* 28, 144-46, 1938.

Kimble, George H. T. Geography in the Middle Ages. X+272 p., 20 pl. London, METHUEN, 1938. ISIS

To be reviewed in *Isis*.

Pfister, Friedrich. Die Schrift eines Germanen über germanische Volksmedizin. *Archiv für Gesch. d. Med.* 30, 266-78, 1938. ISIS

"Im 4. Band des *Corpus Medicorum Graecorum* haben HOWALD und SIGERIST S. 229 ff. eine kleine Schrift "Über den Dachs" (De taxone) veröffentlicht, in der die volkstümlichen Heil- und Schutzmittel besprochen werden, die diesem Tier entnommen werden können. Die Handschriften, die uns diesen Text überliefern und deren älteste dem 9. Jahrhundert angehören, bieten zwei Fassungen dieser Schrift dar, die so sehr voneinander abweichen, dass die Herausgeber sie nebeneinander abdruckten. Es ist die Gleiche Überlieferung wie die des Liber medicinae des SEXTUS PLACITUS, der in unsern Handschriften auf unsern Traktat folgt und im gleichen Band des CML editiert ist. Ich gebe zunächst eine ausführliche Inhaltsangabe unseres Textes."

Thomson, S. Harrison. The criteria of Latin paleography in the study of Anglo-Norman documents. *Romanic review* 112-19, April 1938. ISIS

III. — ORIENTAL SCIENCE AND CIVILIZATION

8. — WESTERN ASIA (*Including "the ancient East" in general*)

Crawford, O. G. S. Tin-deposits in the Near East. *Antiquity* 12, 79-81, 1938. ISIS

Forbes, R. J. Over beloeiing in de oudheid. Jaarbericht n° 5, van het vooraziatisch-egyptisch gezelschap *Ex oriente lux*, 431-60, 1937-38. ISIS

Very erudite study of irrigation in the Ancient East. G. S.

Ünver, A. Süheyl. Quelques mots sur l'ancienneté de la malaria en orient. *Türk tib tarihi arkivi*, vol. 2, 54-5, 1937. ISIS

Yaltkaya, M. S. Quelques mots sur l'odontologie chez les anciens turcs. *Türk tib tarihi arkivi*, vol. 2, 60, 1937. ISIS

CENTRAL ASIA

Gettens, Rutherford J. The materials in the wall paintings of Bāmiyān, Afghanistan. *Technical studies* 6, 186-93, 5 fig., 1938. ISIS

EASTERN ASIA (*Including works relative to the whole of Buddhist Asia, or to India, Central and Eastern Asia combined*)

Langen, C. D. de. Medical training in the Netherlands Indies. *Medical life* 45, 23-31, 1938. ISIS

9. — INDIA

Carpani, Enrico G. La mâṇḍûkya-upanishad. Testo in Devanâgarico traslitterazione, versione e note. 32 p. (*Samâdhi, collana di studi orientali* III). Correggio-Emilia, Tipografia del Povero, 1936. ISIS

Carpani, Enrico G. Nirvâna (filosofia e religione). 47 p. Bologna, ALDINA, 1934. ISIS

Carpani, Enrico G. A philosophical index to the Chândogya-Upaniṣad. *Indian culture* 4, 130-36. (No date on reprint). ISIS

Carpani, Enrico G. Quattro note sul Krishnaismo. 24 p. Reggio-Emilia, CAITI, 1934. ISIS

Carpani, Enrico G. La Vâjasaneyi-saṃhitâ-upanishad (note filosofiche). 40 p. (*Samâdhi, collana di studi orientali*, 2). Reggio-Emilia, CAITI, 1935. ISIS

Chakravarti, Chintaharan. Vaṅgīya sāhitya parishat. A descriptive catalogue of the Sanskrit MSS. in the Vaṅgīya sāhitya parishat. 8+XLV+1+271 p. (Sanskrit) (V. S. P. series, 85). Calcutta, 1936 (Rs. 6-4-0.).

The Catalogue under review gives the names of 1,666 MSS. arranged alphabetically under different subject-groups, viz. : Veda : (1) Saṃhitā, (2) Brāhmaṇas, (3) Upaniṣads, (4) Sūtras, and (5) Miscellaneous; Tantra : (1) Original Tantras and (2) Tāntric digests; Purāṇa (pp. 68-121); Smṛti : (1) Original Smṛti and (2) Smṛti digests; Grammar (Vyākaraṇa) (pp. 157-179); Lexicography (Kośa) (pp. 180-186); Poems : (1) Kāvya and (2) Nāṭaka; Rhetoric and prosody : (1) Alaṅkara and (2) Chandaḥ; Vaiṣṇava works (pp. 221-236); Philosophy : (1) Vedānta, (2) Nyāya-Vaiśeśika and (3) other systems of philosophy; Medical science (Vaidyaka) (p. 252-58); Astronomy and astrology (p. 259-64); History (p. 265); Miscellaneous (p. 266-70).

The most important peculiarities of manuscripts have been indicated in separate columns. Besides, the number of folios in the MSS., the available dates of transcriptions and the scripts in which the MSS. are written have been noticed. The " Remark " column gives references to other catalogues.

In the Introduction the author gives a critical account of the collection in the *Vaṅgīya sāhitya parishat*. Though the interest of the work is chiefly bibliographical, the author has not forgotten to draw attention to some of the important historico-philological features of the collection.

The paper and print are all that can be desired of a scientific publication issued by one of the premier Indian institutions of our time.

(Bologna). E. G. CARPANI.

Filliozat, Jean. Étude de démonologie indienne. Le Kumâratantra de RÂVAṆA et les textes parallèles indiens, tibétains, chinois, cambodgien et arabe. V+192 p. (Cahiers de la Société asiatique, 4). Paris, Imprimerie nationale, 1937. (50 frs.). ISIS

" Le *Kumâratantra* attribué à RĀVAṆA est un rituel de propitiation des démones preneuses d'enfants et il est censé être révélé précisément par un démon, leur chef. Cette circonstance doit déjà attirer l'attention sur lui, car il est utile de rechercher en vertu de quelles idées on a pu attribuer à l'auteur même du mal la révélation du remède. Mais surtout deux faits confèrent à ce texte, insignifiant au premier aspect, un intérêt non médiocre : d'une part il a été incorporé à la médecine indienne, de l'autre il a été répandu dans la plupart des pays d'influence indienne. Il a été incorporé dans les traités médicaux sous sa forme exacte ou sous la forme de textes apparentés qui constituent au sein de la médecine une littérature spéciale dont il est le type. Les traités médicaux reposent sur un système purement naturel où il n'y a pas de place de droit pour la possession démoniaque. Or, le *Kumâratantra*, les textes apparentés et d'une façon générale les morceaux magico-religieux qui se rencontrent dans les livres médicaux y représentent souvent des survivances des époques des Brâhmaṇa et des Dharmaçâstra. Il est donc utile pour l'histoire de la médecine indienne de noter comment et avec quelles conséquences la popularité les a imposés contre la logique. Quant à la diffusion du *Kumâratantra* et des textes dont il est le type en dehors de l'Inde, elle intéresse évidemment l'histoire même de l'expansion indienne."

Hammett, Frederik S. The ideas of the ancient Hindus concerning man. *Isis* 28, 57-72, 1938. ISIS

Hevesy, Guillaume de. Noms ouraliens d'animaux dans l'Inde. *Journal asiatique* 229, 129-39, 1937 (received March 1938). ISIS

Loria, Gino, Singh, A. N. Sur un système d'équations algébriques considéré par les Indiens. *Mathésis*, 327-30, 1937. ISIS

Sharpe, Elizabeth. The secrets of the Kaula circle. A tale of fictitious people faithfully recounting strange rites still practised by this cult. Followed by a translation of a very old MS. on *The science of breath*. 96 p. London, LUZAC, 1936 (3/6). ISIS

The very old ms. is undated and is unidentifiable. It deals with hata

yoga. The text as given in English (p. 75-91) is divided into 154 short numbered paragraphs. We quote the first five :

" 1. In the human body the spirit is chained by the breath, and this breath changes every 5 ' gadis ' and one element (vaya) remains in settled order during each ' gadi.' These elements move, and are named after the 12 signs of the Zodiac.... 2. The breath sometimes comes out from the right nostril, and sometimes out of the left; and sometimes out of both the nostrils. 3. The right nostril is of the sun—Ha; and the left nostril of the moon—Ta; and the science of breath (pranayama) is, therefore, called Hata Yoga, i.e., the conjunction of the sun and moon. 4. When two breaths are working the life runs in the spinal column and is called ' sukshmana '—literally the very fine one. 5. The ' sukshmana ' breath is for meditation alone, and no worldly action will succeed when this breath is working."

Tamil lexicon published under the authority of the University of Madras. 6 vols., II+XXV+3944 p.+CV p. Madras, 1924-36. ISIS

Reviewed by JEAN FILLIOZAT, *Journal asiatique* 229, 348-52, 1937 (received May 1938).

10. — CHINA

Chochod, Louis. La cosmogonie de l'ancienne Chine et ses rapports avec certaines fêtes de l'année civile. *Mercure de France*, 282, 5-25, 1938. ISIS

Creel, Herrlee Glessner. The birth of China. A survey of the formative period of Chinese civilization. 396 p. London, CAPE, 1936. ISIS

Reviewed by T. W. Y., *Geography* 22, 230, 1937. Largely concerned with the Shang and Chou dynasties. C. W. A.

Sykes, Sir Percy. The quest for Cathay. XII+260 p. London, BLACK, 1936. ISIS

Reviewed by R. M. F., *Geography* 22, 230, 1937.

Têng Yen-lin. Union catalogue of books on Chinese mathematics in the libraries of Peiping. Library Association, Peiping 1936 (in Chinese). ISIS

The compiler consulted 19 libraries in Peiping and from this search brought together somewhat over 1,000 titles, all in the Chinese language. These range from the *Chou-pi suan-ching* of the Han dynasty to studies recently published. They do not, however, include textbooks in present-day use. Not only are the early mathematical translations of the Jesuit missionaries included, but also numerous works in various fields of mathe-

matics that were put into the Chinese language by westerners with the help of native collaborators. For example, five works produced by ALEXANDER WYLIE (1815-87) in collaboration with the Chinese mathematician LI SHAN-LAN (1810-82) are here listed. They were published at Sung-chiang and Shanghai during the years 1853-59, one being a work on differential and integral calculus. Other works were similarly produced by JOSEPH EDKINS (1823-1905) and by CALVIN MATEER (1826-1908).

It is worth noting that two Chinese works on astronomy and one on mathematics which have not hitherto been accessible to scholars were printed in 1934 in the *Ssŭ-k'u ch'üan-shu-chên-pên*, or collection of rare works reproduced from the Imperial manuscript library. The two on astronomy are of the Yüan and Ming periods, the one on mathematics is of the Ch'ing. (Reprinted with permission from the yearbook of the Library of Congress, 1937, p. 179).

Washington, D. C. A. W. HUMMEL.

11. — JAPAN

Borton, Hugh. A survey of Japanese historiography. *American historical review* 43, 489-99, 1938. ISIS

Kanda, Shigeru. *Nihon tenmon shiryô* (Source material for the history of astronomy). 770 p. Tokyo, MARUZEN, 1935 (yen 6.50). ISIS

Mr. KANDA of the observatory of the Tokyo Imperial University combed through over 470 historical documents and collected all the passages which deal with astronomical observations. The first reference dates back to 15 B. C., and the editor concludes his task for the time being with the year 1600 A. D. The material thus gathered was classified into the following eight headings : 1. Eclipse of the sun; 2. Eclipse of the moon; 3. Phenomena of the planets; 4. Occultations; 5. Novae, or visibility of stars during the daytime; 6. Comets; 7. Shooting stars; 8. Miscellaneous. When a reference appears in more than one document, it is quoted in the order of importance of the sources. Arranged in chronological order, each entry is accompanied by the Japanese date which is followed in the brackets by the Western date. As to the eclipses of the sun and moon, the editor checked and verified them against OPPOLZER's *Canon der Finsternisse* (Wien, 1887). There is only one reference on the black spots of the sun, a few on the northern lights, and comparatively few phenomena which cannot be identified.

In the preface the editor states that he attempted to quote the original text accurately, but in the case of wrong characters he did not hesitate to correct them. Since the main object of the present compilation was to collect all the available references on the astronomical phenomena, a thorough examination of the entries and their verification must await for a future date.

S. S.

Kanda, Shigeru. *Nihon tenmon shiryô sôran* (Chronological index

of the source material for the history of astronomy). 253 p. Tokyo, MARUZEN, 1935 (yen 2.00). ISIS

For the sake of convenience, the editor lists all the phenomena of the heavenly bodies which appear in the Japanese documents in chronological order. This can almost be considered an index to the *Nihon tenmon shiryô*.
S. S.

Okazaki, Keiichirô. *Nihon beishoku shi* (History of rice diet in Japan : a historical survey of the relation between the rice diet and the beri-beri). 1439 p., pls., ills. Tokyo, MARUYAMA-SHA, 1913. ISIS

In the early part of the present century, the Japanese government appointed a committee to investigate the disease beri-beri which was a menace to the health of the navy and army. Dr. RINTARÔ MORI, surgeon-general of the army, appointed Dr. OKAZAKI to make a historical survey. Dr. OKAZAKI began with the *Kojiki*, the oldest record, and collected all the references relating to the rice diet and beri-beri. The food of the early Japanese consisted of fish and of the flesh of the wild animals, which were not prohibited till the introduction of Buddhism. It seems the rice was the only cereal known to the primitive Japanese and beans, millet, and barley came in a little later. Polishing of rice is recorded in the 10th century documents, and by the 17th century, there were several wholesale dealers of rice bran in the country. Polishing it with sand began in the 19th century.

Known as the disease of lower limbs and of the upper class who dwelt in the city, the beri-beri was considered as contagious, and its cause ascribed to the accumulation of bad humor in the body. Although the diet treatment was suggested in the 16th century, it was not accepted.

The compiler of the present work did not consider analysing and systematizing of the material his duty. Hence in spite of its voluminous size, its importance is slight. S. S.

Ramming, M. The evolution of cartography in Japan. *Imago mundi* 2, 17-21, 1937. ISIS

12. — ISRAEL

(*Including works devoted to Palestine*)

Savitz, Harry Austryn. The role of the Jewish physician in the progress of his people. *Annals of medical history* 10, 107-16, 1938. ISIS

Vajda, Georges. Juifs et musulmans selon le ḥadîth. *Journal asiatique* 229, 57-127, 1937 (received March 1938). ISIS

13. — IRAN

Stein, Sir Aurel. Archaeological reconnaissances in north-western India and south-eastern Iran, carried out and recorded with the support of Harvard University and the British Museum by Sir AUREL STEIN. Antiques examined and described with the assistance of FRED H. ANDREWS and analyzed in an appendix by R. L. HOBSON. xx+268 p., 34 pl. London, MACMILLAN, 1937. ISIS

Reviewed by C. E. A. W. OLDHAM, *Geographical journal* 90, 559-61, 1937. Includes further light on the routes of ALEXANDER THE GREAT, FA-HSIEN, HSÜAN-TSANG, and MARCO POLO. C. W. A.

14. — ISLAM (*also Arabia*)

Abbott, Nabia. Arabic numerals. *Journal of the royal Asiatic society* 277-80, 1938. ISIS

"Taking the facts already presented and the inferences drawn from the general situation, we are safe in concluding that the practice of writing the tens before the units was a generally current alternative to the reverse order from pre-Islamic days, and that its occurrence in poetry was more of the nature of poetic expression than of poetic license."

Adnan, Abd-ul-Hak. La science chez les Turcs Ottomans du commencement jusqu'à la fin du moyen-âge. *Archeion* 19, 347-65, 1937 (received April 1938). ISIS

Mieli, Aldo. O papel mundial da "ciência árabe." Segunda conferência, sua expansão e importância. *Petrus Nonius* 1, 266-84, 1937. ISIS

Siggel, Alfred. Das Sendschreiben das Licht über das Verfahren des HERMES der Hermesse dem, der es begehrt. *Der Islam* 24, 287-306, 1937. ISIS

Apropos of the *Risâlat qabas al-qâbis fî tadbîr Harmas al-Harâmis*, an alchemic writing of unknown date and authorship; posterior to the twelfth century. Arabic text and German versions. G. S.

Ünver, A. Süheyl. Un ouvrage intéressant sur les anciens livres médicaux se trouvant dans nos bibliothèques. *Türk tib tarihi arkivi*, vol. 2, 61-2, 1937. ISIS

IV. — NEW WORLD AND AFRICA

a. — AMERICA

Gilmore, Melvin Randolph. Notes on gynecology and obstetrics of the Arikara tribe of Indians. *Papers of the Michigan Academy of science, arts, and letters* 14, 71-81, 1 pl., 1930. ISIS

Hinsdale, Wilbert B. Archaeological atlas of Michigan. Michigan handbook series no. 4, Ann Arbor, 1931. ISIS

Reviewed by GUY-HAROLD SMITH, *Geographical review* 134-35, 1933.

Lehmann-Nitsche, Robert. Die Sterne und Sternbilder am Hochaltar des Sonnentempels in Cuzco. *Das Weltall* 33, 33-37, 1933-34. ISIS

Pardal, R. El balance positivo de la medicina aborigena americana. Historia de los remedios del indio americano adoptados por la medicina europea. *Actualidad medica mundial*, Buenos Aires, 7, 28-38, 1937. ISIS

Reviewed by L. CASTALDI, *Rivista di storia delle scienze mediche e naturali* 29, 40, 1938.

Reed, H. S. Ixtlilxochitl II and cempoallan : a preliminary study of a Mexican picture-chronicle. *Hispanic American historical review* 18, 66-75, 1938. ISIS

b. — OCEANIA

Evans, Ivor H. N. The Negritos of Malaya. VIII+323 p. Cambridge, University Press, 1937 ($7.00). ISIS

Mr. EVANS, one of our best authorities on the anthropology of the Malay Peninsula, in the present work gives an account of the Negritos which must become the standard work on the subject. The Negritos are regarded by most students as probably the first comers to Malay, and their relation to exogenous peoples constitutes one of the most interesting problems of anthropology. In the present work the author gives an authoritative account of the ethnology and the physical characteristics of the Negritos which is calculated to throw a considerable amount of light upon these probable relations. The book is very well illustrated, and anthropologists are to be congratulated upon its publication. M. F. A.-M.

c. — AFRICA (*outside Egypt and Islam*)

Institut des hautes études marocaines (de Rabat). *Initiation au Maroc*. XIV+357 p. Paris, Les éditions d'art et d'histoire, 1937. ISIS

" C'est à l'occasion de son VIII[e] congrès (Fès, 1933) que l'Institut des hautes études marocaines a donné la première édition de ce livre... Bien que les conditions dans lesquelles ils avaient été imprimés n'aient pas permis de les vendre en librairie, les exemplaires de la première *Initiation au Maroc* ont rencontré auprès des lecteurs l'accueil le plus favorable et se sont trouvés très rapidement épuisés. Une réimpression, tout au moins, semblait nécessaire. On a cru devoir aller plus loin et s'astreindre à refondre presque totalement l'ouvrage. L'achèvement de la pacification, ouvrant à l'exploration des régions jusqu'alors mal connues, les changements inhérents à la vie de tout pays, et dont le rythme au Maroc est particulièrement pressé, le progrès même des études nord-africaines, auxquelles on travaille sans relâche, tout cela imposait une mise au point méthodique et précise. C'est donc un volume presque entièrement nouveau que nous livrons aujourd'hui au public. Le texte a été profondément remanié et la bibliographie complétée d'après les recherches récentes; on a ajouté une série de cartes et l'illustration sans laquelle on ne conçoit plus actuellement un ouvrage de ce genre."

I. J. CÉLERIER : Le milieu physique; II. HENRI TERRASSE : Le milieu historique et artistique; III. G. S. COLIN et E. LÉVI-PROVENÇAL : Le milieu indigène, Les habitants, La vie intellectuelle, 1. E. LÉVI-PROVENÇAL : La littérature; H. P. J. RENAUD : Le mouvement scientifique; Les parlers, 1. E. LAOUST : Le berbère; G. S. COLIN : L'arabe. IV. RENÉ HOFFHERR et P. MAUCHAUSSÉ : L'organisation et l'activité économique du Maroc actuel.

C'est naturellement le chapitre III qui intéressera le plus les lecteurs d'*Isis*, surtout les parties rédigées magistralement par E. LÉVI-PROVENÇAL, E. LAOUST, G. S. COLIN et notre cher confrère le Dr. RENAUD. Il ne manque qu'un index. Les illustrations sont fort belles. G. S.

Wieschhoff, Heinz A. Concepts of right and left in African cultures. *Journal of the American oriental society* 58, 202-17, 1938. ISIS

PART III

SYSTEMATIC CLASSIFICATION

I. — SCIENCE IN GENERAL

16. — HISTORY OF SCIENCE

(Belgium). Ministère de l'instruction publique. Bibliothèque royale de Belgique. Histoire des sciences en Belgique jusqu'à la fin du XVIII[eme] siècle. Exposition. Bruxelles, 12 février - 15 avril 1938 (1 vol. 160 p.). ISIS

See under VINCENT, AUGUSTE.

Birkenmajer, Aleksander. Coup d'œil sur l'historiographie polonaise des sciences dans la période 1887-1937 (in Polish). 12 p. Lwów, Z Drukarni Zakładu Narodowego Imienia Ossolińskich, 1937. ISIS

Buffalo Museum of science. Milestones of science. A reference list of epochal books now being assembled by the Museum. 172 items. Buffalo, N. Y., 1938. ISIS

Carnegie Institution of Washington. Division of historical research. Section of the history of science. Nineteenth annual report for the period extending from July 1, 1936 to June 30, 1937. *Isis* 28, 87-91, 1938. ISIS

I. Introduction to the history of science; II. Maya astronomy; III. Other investigations; IV. Editing of *Isis* and *Osiris*. V. Lectures; Bibliography.

Congrès international d'histoire des sciences, III^e^. Tenu au Portugal du 30 septembre au 6 octobre 1934, sous le haut patronage de S. E. le président de la République portugaise. Actes, conférences, et communications. XLIX+462 p., pl., maps. Lisboa, 1936. ISIS

Reviewed by GEORGE SARTON, *Isis* 28, 135-38, 1938.

Dony-Hénault, Oct. L'ornement des sciences expérimentales. *Acad. r. de Belgique, bull. de la cl. des sciences* 22, 1415-1435, 1936. ISIS

Recopions de ce discours académique le passage suivant (pp. 1422-1423), qui contient une intéressante objection à l'inscription de l'histoire des sciences au programme de l'enseignement secondaire :

" J'ai moi-même, durant ma jeunesse, enseigné les jeunes adolescents; j'ai toujours remarqué leur frigidité totale à l'égard du récit des découvertes fondamentales. Pour eux, une chose simple est une chose facile. C'est selon moi une des raisons qui rend peu favorable l'introduction de l'expérience proprement dite, je ne dis pas de l'observation, dans l'enseignement des jeunes collégiens; car tel récit des plus belles découvertes de la physique qui inspire au maître l'émotion laisse, en général, l'élève indifférent.

Pour ceux qui admettent que, jusqu'à un certain point, l'évolution individuelle récapitule une évolution de l'espèce, est-il logique de croire que l'enfant, ou le tout jeune homme, soit mûr pour observer à 15 ans ce qu'un PASCAL, un GALILÉE, un NEWTON ont découvert il y a si peu de siècles? Ceux qui rêvent, ou ceux qui projettent d'introduire dans l'enseignement moyen de plus fortes doses de science expérimentale feront bien de méditer cette objection. Tout l'enseignement de la chimie industrielle, et je ne crois pas qu'il en soit autrement de celui de la physique appliquée, montre avec quelle lenteur l'esprit technique atteint le maximum de simplicité.

Exerçons donc les jeunes gens à l'observation simple, enrichissons leur imagination, utilisons la merveilleuse plasticité de leur cerveau, mais ne les

plaçons pas trop tôt en face des découvertes du génie qui les incitent à dire : Ce n'est pas plus difficile que cela !

C'est à un certain degré de maturité, après avoir appris par lui-même ce que peut coûter d'efforts la réalisation d'une simple trouvaille, que l'homme peut goûter les véritables enchantements de la science pure." J. P.

Dustin, Albert. La science et la femme. Discours rectoral prononcé à la séance solennelle de rentrée, le 15 octobre 1937. *Rev. de l'Univ. de Bruxelles*, 43, 21-44, 1937-38. ISIS

Friend, Julius W.; Feibleman, James. What science really means. An explanation of the history and empirical method of general science. 222 p. London, ALLEN & UNWIN, 1937. ISIS

To be reviewed in *Isis*.

Gunther, R. T. Early science in Cambridge. XII+513 p. Printed for the author at the University Press, Oxford, 1937. ISIS

Reviewed by M. F. ASHLEY-MONTAGU, *Isis* 28, 134, 1938.

Gunther, R. T. Early science in Oxford. Vol. XI, Oxford colleges and their men of science. XVI+429 p., Oxford, printed for the author, 1937. ISIS

The earlier volumes of this valuable collection have been reviewed in *Isis* as follows, vols. I-II (1920-23) in vol. 6, 449-53; vol. III in vol. 8, 375-77; vol. IV, in vol. 13, 118-19; vol. V, in vol. 14, 233-35; vol. VI-VII, in vol. 15, 174-77; vol. VIII, in vol. 16, 498; vol. X in vol. 25, 466-70. "The present volume is designed to set out the achievements of the more scientifically minded Oxford men, College by College. It also includes a reprint of the inaugural lecture of Oxford's first University Reader in the history of science, delivered in October 1934."

G. S.

Harvard University. Seminary on the history of science and learning. 2nd year (1936-37). *Isis* 28, 95-6, 1938. ISIS

Heindel, Richard Heathcote. Americans and the Royal Society 1783-1937. *Science* 87, 267-72, 1938. ISIS

Heindel, Richard Heathcote. Historical manuscripts in the Academy of natural sciences, Philadelphia. *Pennsylvania history* 5, 30-1, 1937. ISIS

Isis, Editorial board. Appointment of Dr. JOHN BERTRAND DE CUSANCE MORANT SAUNDERS. *Isis* 28, 100, 1938. ISIS

Lacroix, Alfred. Discours prononcé à la séance de clôture du congrès des sociétés savantes à Montpellier. 27 p. Paris, Imprimerie nationale, 1936. ISIS

Osiris. Studies on the history and philosophy of science, and on the history of learning and culture, vol. I. The DAVID EUGENE SMITH presentation volume. Bruges, 1936. ISIS

Reviewed by E. ZINNER, *Vierteljahrsschrift d. Astronomischen Gesellschaft* 72, 45-7, 1937.

Sarton, George. Fifty-first critical bibliography of the history and philosophy of science and of the history of civilization (to end of July 1937 — with special reference to mechanics, astronomy and physics). *Isis* 28, 155-316, 1938. ISIS

"This fifty-first Bibliography contains about 945 items of which 64 deal with mechanics, astronomy and physics. They have been kindly contributed by fourteen scholars belonging to six different countries."

Sarton, George. The history of science and the new humanism. XX+196 p. (Colver lectures in Brown University, Elihu Root lecture at the Carnegie Institution of Washington). Cambridge, Mass., Harvard University Press, 1937. ISIS

Reviewed by F. S. MARVIN, *Nature* 141, 577, 1938; by FREDERICK BARRY, *American historical review* 43, 673, 1938; and by MAX RADIN, *Speculum* 13, 119-21, 1938.

Sarton, George. An institute for the history of science and civilization (third article). *Isis* 28, 7-17, 1938. ISIS

Schurmann, Pablo F. La historia de la ciencia y su introducción en la enseñanza secundaria. *Archeion* 19, 368-71, 1937 (received April 1938). ISIS

Stephens, D. Owen. Flow of horizons. 190 p., 45 fig. New York, DAY, 1936 ($2.50). ISIS

Interesting as a unique effort to translate the evolutionary processes in the cosmos and in the world of life as an emotional, racial experience remembered and felt. C. A. K.

Vincent, Auguste. Histoire des sciences en Belgique jusqu'à la fin du XVIII^{e} siècle. Exposition. 160 p. (Bibliothèque royale de Belgique). Bruxelles, 1938. ISIS

L'exposition " est divisée en quatre périodes. La première s'étend jusqu'à la fin du XV^e siècle. Nos principautés se sont fait remarquer alors surtout par leurs médecins. Le plus ancien dont nous puissions faire mention est JEAN DE ST. AMAND, chanoine de Tournai, qui vivait vers 1200, qui devint professeur à la Faculté de médecine de Paris, et qui doit être considéré comme un des plus grands médecins de son époque. Il fut le seul avant VÉSALE qui donna à la médecine des bases rationnelles, et en même temps il est le plus ancien botaniste belge connu. Remarquons qu'à la fin du 15^e siècle les études de médecine s'étaient déjà spécialisées chez nous. JEAN VELDENEER, vers 1484, imprima à Louvain le livre des maladies infantiles de CORNEILLE ROELANTS, qui fut le médecin de MARGUERITE D'AUTRICHE. Le 16^e siècle fut pour notre pays une époque de remarquable activité scientifique. C'est alors que vécurent ANDRÉ VÉSALE, le premier des anatomistes de son temps, DODOENS, le grand botaniste, et un des plus remarquables mathématiciens de toutes les époques : SIMON STÉVIN. Le 17^e siècle, s'il fut moins important, nous permet cependant de citer VAN HELMONT qui découvrit l'anhydride carbonique, JAN DELAET, le fondateur de la médecine tropicale, et des astronomes dont la renommée dépassa de beaucoup nos frontières, tels GODEFROID WENDELIN, astronome et météorologue, ANDRÉ JACQUET, mathématicien et astronome, le Père FERDINAND VERBIST qui s'illustra en Chine, où il fut président de l'Observatoire de Pékin, et qui publia une série d'œuvres en chinois sur des questions d'astronomie. Le 18^e siècle fut chez nous une période plutôt terne du point de vue scientifique; quelques noms toutefois ont échappé à l'oubli : ceux de l'anatomiste PALFYN à qui on attribue l'invention des forceps; de HENRI JOSEPH RÉGA qui fonda à l'Université de Louvain, où il enseigna, un des premiers laboratoires de physique et de chimie, et qui créa un amphithéâtre de dissection; d'EUGÈNE JOSEPH CHARLES D'OLMEN, baron de Poederlé, le créateur de la dendrologie en Belgique, et enfin, de MINCKELEERS, professeur au Collège du Faucon, à Louvain, qui découvrit le gaz de houille."

17. — ORGANIZATION OF SCIENCE

(Internal organization is meant, see Isis 1, 195. *For external organization, national, or international, see section* 55).

Białobrzeski, Czesław. La science et la culture. *Organon* 2, 17-42, 1938. ISIS

(Congresses). Organisation des congrès scientifiques. *Organon* 2, 133-236, 1938. ISIS

Lacroix, Alfred. La recherche scientifique dans les territoires d'Outre-mer. Congrès de la recherche scientifique dans les territoires d'Outre-mer, 15 p., Paris, 1938. ISIS

Perrin, Jean, Discours de. Académie des sciences, séance publique annuelle du lundi 21 décembre 1936. 7 p. Paris, GAUTHIER-VILLARS, 1936. ISIS

Suchodolski, Bogdan. Investigation and teaching. *Organon* 2, 43-78, 1938. ISIS

18. — PHILOSOPHY OF SCIENCE

Fassett, Frederick, C., jr. Science and culture. Does the dignity of life become greater as we learn more of its complexity? *Technology review* 312-14, May 1938. ISIS

Michalski, Stanisław (editor). *Organon*, international review. Vol. II, 302 p. Published by the Mianowski Institute for the promotion of science and letters, Warsaw, Staszic Palace, 1938. ISIS

The purpose of *Organon* was explained here (vol. 26, 562) when vol. I appeared in 1936. *Organon* I was analyzed in *CB* 48; *Organon* II is analyzed in *CB* 54.

Schuhl, Pierre-Maxime. Machinisme et philosophie. 108 p. (Nouvelle encyclopédie philosophique). Paris, ALCAN, 1938. ISIS

The relations of "machinism" to technology, ideas and social life from classical antiquity to the "modern crises" are traced in 108 pages.
R. K. M.

Zawirski, Zygmunt. Science et philosophie. *Organon* 2, 1-16, 1938. ISIS

II. — FORMAL SCIENCES (*knowledge of forms*)

20. — MATHEMATICS

Davis, H. T. Mathematical adventures in social science. *American mathematical monthly* 45, 93-104, 1938. ISIS

Gandz, Solomon. The origin and development of the quadratic equations in Babylonian, Greek, and early Arabic algebra. *Osiris* 3, 405-557, 1937 (publication delayed until March 1938). ISIS

See note under *Babylonia*.

Hogben, Lancelot. Mathematics for the million. XII+647 p. New York, NORTON, 1937. ISIS

Reviewed by M. F. ASHLEY-MONTAGU, *Isis* 28, 138-40, 1938; and by H. T. DAVIS, *Isis* 28, 140, 1938.

Loria, Gino. Teaching the history of mathematics. *Mathematical gazette* 21, 274-75, 1937. ISIS

A scheme of a university course. C. W. A.

Tietjen, Cl. H. Raum oder Zahl? Mit einem Geleitwort von Ministerialdirektor Dr. VAHLEN. 30 Figuren im Text und 7 Tonbilder. 51 p. (Schule im Aufbau aus völkischer Wirklichkeit, 6). Leipzig, BRANDSTETTER, 1936. ISIS

" Geleitwort : ' Der Raum ist durch die Anschauung im Gegensatz zur Zahl unmittelbar gegeben; schöpferische Raumanschauung ein Vorzug nordischer Rasse. Die Lehre vom Raum beginne auf der frühesten Unterrichtsstufe und werde die Grundlage des Rechenunterrichts.' Berlin, 23.6. 1936. Ministerialdirektor, Professor Dr. VAHLEN, Chef des Amts für Wissenschaft."

This book is an interesting contribution to the following subject : How to prostitute mathematics to Nazi ideology. It ends properly with a quotation from *Mein Kampf*. Poor German children ! G. S.

III. — PHYSICAL SCIENCES (*knowledge of inorganic nature*)

23. — ASTRONOMY

Bauer, Georg Karl. Sternkunde und Sterndeutung der Deutschen im 9.-14. Jahrhundert unter Ausschluss der reinen Fachwissenschaft. 183 p. (*Germanische Studien*, 186). Berlin, EBERING, 1937. ISIS

Reviewed by E. ZINNER, *Vierteljahrsschrift d. Astronomischen Gesellschaft* 72, 48-9, 1937.

Ionides, Stephen A. Astrolabes. *The engineers bulletin*, 2 p., Jan. 1938. ISIS

Seares, Frederick H. Magnitudes again. *Science* 87, 1-8, 1938. ISIS

Wijk, W. E. van. De Gregoriaansche kalender. Een technisch-tijdrekenkundige Studie. x+76 p. + 1 p., 13 fig., Maastricht, publisher, author, A. A. M. STOLS, 1932. ISIS

Reviewed by A. POGO, *Isis* 28, 140-42, 1938.

Zinner, E. Die Herkunft des Wortes " Sternwarte." *Vierteljahrsschrift der Astronomischen Gesellschaft* 72, 1 p., 1937. ISIS

24. — PHYSICS

Millikan, Robert Andrews; Gale, Henry Gordon; Edwards, Charles William. A first course in physics for colleges. Revised edition. XIII+712+LXII p., figs. Boston, GINN, 1938 ($4). ISIS

This admirable textbook first published in 1928 has been brought up to date in the best manner. " Discoveries of the most far-reaching importance have come to light : the discrete, or photon, theory of all electromagnetic radiation has become generally accepted; the new and heretofore undreamed of particles, the neutron and the positive electron, have appeared; and new types of radiation involving enormous particle energies, cosmic rays, have been found. Accordingly, revisions in physical theory of a very fundamental nature have been required. The old experimentally established laws, of course, remain unchanged; but they require restatement and extension even for the purposes of a first course. The authors have been in a rather favored position for understanding, appraising, and reflecting this new knowledge, and they have endeavored herein to present it in as simple and intelligible a form as possible." The many new applications have been described, the social significance of science explained, and some attention paid to its history, witness a number of portraits. Happy the young students who obtain their scientific initiation from such a well balanced treatise. G. S.

Northrop, F. S. C. The history of modern physics in its bearing upon biology and medicine. *Yale journal of biology & medecine* 10, 209-32, 1938. ISIS

25. — CHEMISTRY, PHYSICO-CHEMISTRY INDUSTRIAL CHEMISTRY

Antropoff, Andreas von. Les formes usuelles du système périodique des éléments. *Annales Guébhard-Séverine* 13, 161-74, 6 fig., 1 pl., 1937 (in French, with English summary). ISIS

Davis, Tenney L. Pictorial representations of alchemical theory. *Isis* 28, 73-86, 8 fig., 1938. ISIS

Haynes, Williams. Chemicals in the industrial revolution. 26 p. American branch, Newcomen society, 1938. ISIS

McKie, Douglas. Some early work on combustion, respiration and calcination. *Ambix* 1, 143-65, 1938. ISIS

From REY (1630) to BLACK (1756).

Ruska, Julius, und die Geschichte der Alchemie, mit einem vollständigen Verzeichnis seiner Schriften. Festgabe zu seinem 70. Geburts-

tage am 9. Februar 1937. 40 p. (*Abhandlungen zur Geschichte der Medizin und der Naturwissenschaften*, H. 19). Berlin, EBERING, 1937. ISIS

Speter, Max. Drei alkoholgeschichtliche Notizen : I. Synthese von Alkohol bereits durch HENNELL (1826-1828), vor BERTHELOT (1855). II. T. R. FORSTERS Verfahren zur Gewinnung von Branntwein aus Mohrrüben (1790). III. Das bisher ältestnachweisbare Vorkommen des Wortes " Fusel " (1736). *Zeitschrift für Spiritusindustrie* p. 71-72, 1938. ISIS

Speter, Max. Ergänzungs-Nachtrag zu den " Drei alkoholgeschichtliche(n) Notizen." *Zeitschr. f. Spiritusindustrie* 1 p., 1938. ISIS

Wraný, Adalb. Geschichte der Chemie und der auf chemischer Grundlage beruhenden Betriebe in Böhmen bis zum Mitte des 19. Jahrhunderts. VII+397 p. Prag, 1902. ISIS

26. — TECHNOLOGY

(*For mining, see* 32. *geology; for industrial chemitry,* 25. *chemistry See also Arts and crafts under* 45)

Artz, Frederick B. Les débuts de l'éducation technique en France (1500-1700). *Revue d'histoire moderne* 55 p., Sept.-Dec. 1937. ISIS

Davis, Sir Robert H. Deep diving and under-water rescue. 62 p. London, Royal Society of arts, 1934. ISIS

Historical summary with many illustrations. C. W. A.

Morgan, Willard D.; Lester, Henry M. Leica manual. 578 p., ill. New York, MORGAN & LESTER, 1938 ($4.00). ISIS

The 3rd edition of this excellent manual dealing with every conceivable use to which the camera may be put. M. F. A.-M.

Richards, G. Tilghman. Handbook of the collection illustrating typewriters. A brief outline of the history and development of the correspondence typewriter with reference to the national collection, and descriptions of the exhibits. 58 p., 10 pl. (Board of education, Science Museum). London, His Majesty's Stationery Office, 1938 (1s. 3d.). ISIS

"The collection of typewriters includes original examples of most of the important developments which have taken place between 1829 and the present day. It shows the evolution of the typewriter from a slow and primitive writing appliance to the modern highly efficient manual and electrically operated machines which play such an important part in business, literary, and private use." The book is divided as follows : Introduction and grouping system of the exhibits; Historical notes and descriptions of the exhibits in chronological order. Some 85 exhibits are carefully described and compared. G. S.

IV. — BIOLOGICAL SCIENCES (*knowledge of organic nature*)

27. — BIOLOGY (*generalities, "natural history"*)

American neurological association for the investigation of eugenical sterilization, Committee of the : ABRAHAM MYERSON, JAMES B. AYER, TRACY J. PUTNAM, CLYDE E. KEELER, LEO ALEXANDER. Eugenical sterilization. A reorientation of the problem. VIII+211 p., New York, MACMILLAN, 1936 ($3.00). ISIS

Historically important by reason of digest of laws governing sterilization; analyses of commitment rates in Massachusetts, New York, and foreign countries; summary of differing viewpoints on sterilization; and discussions of the relations of sterilization to inheritance of mental diseases and crime. Recommendations are for voluntary not compulsory sterilization, application of the law to patients in private as well as public institutions, trained boards of administration, and legal protection for boards and surgeons. A list of diseases recommended for consideration by competent boards is given. C. A. K.

Benedict, Ralph C.; Knox, Warren W.; Stone, George K. High school biology. XI+724 p., pls., figs. New York, MACMILLAN, 1938. ISIS

Excellent textbook well designed to stimulate the curiosity of young students and awaken their biological vocation, if such be latent in them. The treatment throughout is suggestive rather than exhaustive. The illustrations are abundant and well chosen. Such a book makes the reader wish that he were younger and could begin his biological training anew in such pleasurable fashion. G. S.

Du Noüy, Lecomte P. Biological time. X+180 p., 31 fig. London, METHUEN, 1936; New York, MACMILLAN, 1937 (7/6; $2.00). ISIS

This presents a biological concept of time as measured by the rate of cicatrization of wounds and of proliferation of cells in tissue cultures. These indices are compared with the individual's calendar age in order to express his age in physiological terms. The cosmic clock and the organismal tempo are

not synchronous. Historically this concept emerged from experiments with the healing process in wounds of hospitalized soldiers in France. In collaboration with Dr. ALEXIS CARREL, studies were made of the rates of healing of wounds as influenced by surface areas and peripheral margins and also in tests of various antiseptics and dressings. The age of the patient was found to have an important relation to the rate of the healing process.

The subject is treated in three parts : 1) The biological problem and the methods used: 2) Cicatrization of wounds and tissue culture, and 3) time. The last treats of the metaphysical aspects of the ideas evolved from these phenomena, introducing the concept of relativity into biology. It is obvious that this concept may have much wider applications of the fourth dimension to all vital processes in the individual and to the phenomena of evolution.

C. A. K.

Oparin, A. I. The origin of life. Translated with annotations by SERGIUS MORGULIS. XII+270 p., 8 fig. New York, MACMILLAN, 1938 ($2.75). ISIS

The author expounds a theory that the living cell is the result of a long process of chemical evolution of compounds of carbon and nitrogen which he calls organic substances. These arose in archaic seas as colloidal systems. Their potential energies were utilized by enzymes which resulted from the evolution of catalysts and promotors built up in systems of increasing complexity under natural selection. Unity and continuity characteristic of life arise from an orderly succession of chemical changes based on complex organizations of these systems.

The first three chapters deal with the older theories of the spontaneous generation of life, the continuity of life, and the origin of life at some remote period in the earth's existence. This historical discussion is based in large part upon LIPPMANN's *Urzeugung und Lebenskraft* (1933). It covers the subject from THALES and ANAXIMANDER to PREYER and KOSTYCHEV. The statement is made that the divergent views on this subject have always reflected the underlying struggle of social classes. C. A. K.

Pearl, Raymond. On biological principles affecting populations : human and other. *American naturalist* 71, 50-68, 1937. ISIS

Studnička, F. K. Noch einiges über das Wort Protoplasma. *Protoplasma* 27, 619-25, 1937. ISIS

" WEBER (1936) erörtert die Geschichte des Wortes ' Protoplasma ' und stellt entgegen der Ansicht von MOEBIUS (1934) fest, dass PURKINJE und nicht — wie so oft angegeben wird — HUGO VON MOHL der Schöpfer des Terminus Protoplasma ist. WEBER macht darauf aufmerksam, dass sich die Stelle bei PURKINJE, an der das Wort ' Protoplasma ' vorkommt, nicht in seiner Kritik des Schwannschen Buches aus dem Jahre 1840, sondern in dem Referate über einen Vortrag, den PURKINJE in der ' Schlesischen Gesellschaft für vaterländische Kultur,' in Breslau gehalten hat, befindet. Diese historischen Ausführungen seien in folgendem ergänzt. Der Vortrag von PURKINJE, um den es sich handelt, wurde am 16. Januar des Jahres 1839, zu einer Zeit,

in der er bereits die ersten zwei Hefte des im Erscheinen begriffenen Werkes von SCHWANN (1839) kennen konnte, gehalten und enthält eine Stellungnahme zu den Ausführungen von SCHWANN, mit denen PURKINJE 'auf Grund seiner besseren Kenntnis' — wie sich M. HEIDENHAIN (1907) ausdrückt — nicht einverstanden war."

Woodruff, Lorande Loss. Animal biology. Second edition. xiv+535 p., 312 fig. New York, MACMILLAN, 1938. ($3.75). ISIS

"This is a thorough revision of the first edition of this text, with an additional chapter on 'The human background' which discusses prehistoric man. New material has been added throughout the book, especially in the sections on genetics, and all topics have been brought up-to-date. The same approach and method of presenting material is used in this text as in the author's highly successful *Foundations of biology*. Animal biology is treated from the general biological point of view, broad principles are illustrated by specific instances, and a synoptic view of diverse animal forms supports the great biological generalizations. Approximately 300 figures illustrate the book. The author is professor of biology at Yale University."

28. — BOTANY

(*Agronomy, phytopathology, palaeobotany*)

Arents, George, jr. Books, manuscripts and drawings relating to tobacco from the collection of GEORGE ARENTS, jr. 113 p. Library of Congress, Washington, D.C., 1938. ISIS

Arents, George. Early literature of tobacco. 13 p. Washington, D. C., Library of Congress, 1938. ISIS

Bedevian, Armenag K. Illustrated polyglottic dictionary of plant names in Latin, Arabic, Armenian, English, French, German, Italian and Turkish languages including economic, medicinal, poisonous and ornamental plants and common weeds. 1711 illustrations. With a preface by W. LAWRENCE BALLS. xv+643+455+(8 p. in Arabic). Cairo, Argus & Papazian Presses, 1936 (£20.6.0). ISIS

Dangeard, Pierre-Augustin. Discours de. Institut de France, Académie des sciences, séance publique annuelle du lundi 16 décembre 1935. 16 p. Paris, GAUTHIER-VILLARS, 1935. ISIS

Glock, Waldo S. Principles and methods of tree-ring analysis. With a foreword by A. E. DOUGLASS and a contribution by G. A. PEARSON. VIII+100 p., 14 pl., 43 fig. Carnegie Institution, Washington, D.C., 1937. ISIS

Lacroix, Alfred. Notice historique sur les cinq DE JUSSIEU, membres de l'Académie des sciences (1712-1853). Leur rôle d'animateurs des recherches d'histoire naturelle dans les colonies françaises. Leurs principaux correspondants. Lue en la séance publique annuelle du 21 décembre 1936. 97 p. (Institut de France, Académie des sciences). Paris, GAUTHIER-VILLARS, 1936. ISIS

Messedaglia, Luigi. Per la storia delle nostre piante alimentari; il riso. *Rivista di storia delle scienze mediche e naturali* 29, 1-15, 1938. ISIS

Schafer, Joseph. The social history of American agriculture. x+ 302 p., 2 pl., 6 fig. New York, MACMILLAN, 1936. ISIS

Reviewed by CHARLES A. KOFOID, *Isis* 28, 149-50, 1938.

29. — ZOOLOGY

Batchelder, Charles Foster. An account of the Nuttall ornithological club 1873 to 1919. 109 p., 1 pl., 36 ports. (Memoir no. 8). Cambridge, Mass., Nuttall ornithological club, 1937 (quarto size). ISIS

This history covers the period from the foundation of the club November 24, 1873, to the death in 1919 of WILLIAM BREWSTER, its president from its foundation to 1919, except for one year. During these forty-six years this society formed a nucleus of ornithologists more or less associated with Harvard University although the club itself was never in any way connected therewith. Under the stimulating leadership of BREWSTER and his associates young ornithologists often upon entering Harvard University found in this society nurture and stimulus. Not a few names of men famous in this science appear in the roster of its members.

This account is enriched by the author's personal reminiscences of the members and illustrated by thirty-six portraits of ornithologists usually taken at the time of their admission. The work includes also a list of officers and brief biographical sketches of all of its members. A very fine portrait of WILLIAM BREWSTER forms its frontispiece.

This club apparently was the first American ornithological society. Some of its members were included among those who founded the American ornithologists' union in 1883 with a geographically wider membership and higher professional standards. Its *Bulletin* also gave way to *The auk* at this time. The example of the pioneer Nuttall club has been followed elsewhere in America in the foundation of local societies held together primarily by their interest in the local avian fauna. Thus by example its historical influence has been widespread. C. A. K.

Cunningham, Bert. Axial bifurcation in serpents. VII+117 p. Durham, Duke University Press, 1937 ($2.50). ISIS

An account of all the available records of double-headed, and sometimes double-tailed, snakes, published and unpublished, from the earliest times to the present day, with the specimen figured whereever it has been possible to obtain such a figure. There is an exhaustive bibliography.

M. F. A.-M.

Gudger, E. W. Fishes and rings. Notes and illustrations of various fishes wearing rubber bands. *Scientific monthly* 45, 503-12, 1937.

ISIS

Gudger, E. W. The natural history and geographical distribution of the pointed-tailed ocean sunfish (*masturus lanceolatus*), with notes on the shape of the tail. *Proceedings of the zoological society of London*, series A, 353-96, 5 pl., 1937. ISIS

Laufer, Berthold. The domestication of the cormorant in China and Japan. *Field museum of natural history publication* 300, *anthropological series*, 18, 201-62, 4 pl., 1931. ISIS

Parker, G. H. Color changes of animals in relation to nervous activity. x+74 p., 40 fig. Philadelphia, University of Pennsylvania Press, 1936. ISIS

Reviewed by CHARLES A. KOFOID, *Isis* 28, 146-49, 1938.

Wilson, H. F.; Doner, M. H. The historical development of insect classification. 133 p. Madison, Wisc., the Authors, 1937 ($4.50).

ISIS

This is a historical survey of all major systems of classification of insects from DEMOCRITUS, 460 B. C. to the present, including comment on many early attempts in this field, such as those by ARISTOTLE, PLINY, ALDROVANDUS, AGRICOLA, SWAMMERDAM, RAY, FABRICIUS, HOME, LAMARCK, ILLIGER, CUVIER, FISCHER, and more recent systematists. The systems are classified according to the dominant character or characters utilized, such as habitat, wings, trophi, metamorphosis, etc., rather than in one chronological series. The result is a demonstration of the diversity of views as to the proper arrangement of orders of insects.

C. A. K.

V. — SCIENCES OF THE EARTH

(Implying knowledge of both organic and inorganic nature)

31. — GEOGRAPHY AND OCEANOGRAPHY

Club Alpin français. Commission des travaux scientifiques. L'œuvre scientifique du Club Alpin français. (1874-1922). VI+518 p. Paris, 1936. ISIS

Reviewed by DANA B. DURAND, *Isis* 28, 143-44, 1938.

Hennig Richard. Terrae incognitae : eine Zustammenstellung und kritische Bewertung der wichtigsten vorcolumbischen Entdeckungsreisen. Bd. I, Altertum bis PTOLEMÄUS. Bd. 2, 200-1200 n. Chr. x+384 p.; x+400 p. Leiden, BRILL, 1936-7. ISIS

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Lopes, Francisco Fernandes. Quatro ilhas dos açôres : S. LUIZ, S. DINIZ, S. TOMAZ, SANTA IRIA. *Petrus Nonius* 1, 261-64, 1937. ISIS

Olsen, Örjan. La conquête de la terre. Histoire des découvertes et des explorations des origines à nos jours, trad. du norvégien par E. GUÈRRE, tomes V et VI. 291+329 p. Paris, PAYOT, 1936-37. ISIS

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Contents : 1. The Babylonian cosmos on a clay tablet : 2. The Germanic cosmos on the gold disc from Moordorf; 3. The cosmos from Teleilat Ghassul on the Dead Sea.

Winter, Heinrich. The pseudo-Labrador and the oblique meridian. *Imago mundi* no. 11, 61-73, 1937. ISIS

According to Dr. ERWIN RAISZ, to whom I submitted this paper, the main idea of it is "if we straighten out the shore lines of Greenland (Pseudo-Labrador) and Labrador according to the meridian which is shown on the PEDRO REINEL map, we get a much more understandable and realistic shape. This is easily visible from the figure on page 66."

32. — GEOLOGY, MINERALOGY, PALAEONTOLOGY, MINING

(*For palaeobotany, palaeozoology and palaeoanthropology, see respectively*, 28. *botany*, 29. *zoology and* 39. *prehistory*).

Holland, Sir Thomas H. The permanence of oceanic basins and continental masses. 22 p. London, MACMILLAN, 1937. ISIS

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VI. — ANTHROPOLOGICAL AND HISTORICAL SCIENCES

(Knowledge of man, past and present)

34. — ANATOMY

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Futcher, Palmer Howard. Giants and dwarfs. A study of the anterior lobe of the hypophysis. 80 p. Cambridge, Mass., Harvard Univ. Press, 1932. ISIS

Homburger, Lilias. Noms des parties du corps dans les languages Négro-Africains. V+118 p. (*Collection linguistique*, publ. par la Société de linguistique de Paris, 25). Paris, CHAMPION, 1929. ISIS

Reviewed by E. ZYHLARZ, *OLZ* 35, 504, 1932.

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35. — PHYSICAL ANTHROPOLOGY

(Anthropometry and races of man)

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Reviewed by PIERRE BRUNET, *Archeion* 17, 107-08, 1935.

Holmes, S. J. The Negro's struggle for survival. XII+296 p. Berkeley, University of California Press, 1937 ($3.00). ISIS

An important contribution to the study of human ecology with especial reference to the American Negro. M. F. A.-M.

Huxley, Julian S.; Haddon, A. C. We Europeans : a survey of " racial " problems. VIII+246 p., maps, ills. New York, HARPER, 1936. ISIS

Reviewed by H. J. FLEURE, *Geographical review* 26, 704, 1936 and by E. G. R. T., *Antiquity* 10, 112-13, 1936.

Kobler, Richard. Der Weg des Menschen vom Links- zum Rechtshänder. Ein Beitrag zur Vor- und Kulturgeschichte des Menschen. IX+142 p. Wien, PERLES, 1932. ISIS

Reviewed by BERNDT GÖTZ, *DLZ* 4, 1863-66, 1933, and by HABERLING, *Mitt. z. Gesch. d. Med.* 32, 37, 1933.

Leclainche, Emmanuel, Discours de. Académie des sciences, séance publique annuelle du lundi 20 décembre 1937. 16 p. Paris, GAUTHIER-VILLARS, 1937. ISIS

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Mendes-Corrêa, António Augusto. La nouvelle anthropologie criminelle. *Scientia* 51, 357-65, 1932. ISIS

Montandon, George. La race, les races, mise au point d'ethnologie somatique. 299 p., 24 pl., 1 map. (Bibliothèque scientifique). Paris, PAYOT, 1933. ISIS

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36. — PHYSIOLOGY (*human and comparative*)

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Diepgen, Paul. Aus der Geschichte des Blutkreislaufs. *Fortschritte der Medizin* 50, 7 p., 1932. ISIS

Garrison, Fielding H. The skin as a functional organ of the body. *Bull. New York Acad. Med.* 9, 417-32, 1933. ISIS

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La question du sommeil, après avoir été un des problèmes les plus irritants de la biologie, s'est trouvée singulièrement éclairée depuis une dizaine d'années; c'est qu'à côté de la face physiologique du problème, qui était seule envisagée, les chercheurs en ont aussi abordé le côté psychologique. L'auteur expose et coordonne ici ces connaissances nouvelles qui font " que le sommeil n'est plus une croix de la physiologie mais, au contraire, une de ses plus belles acquisitions." 1. Le sommeil physiologique; 2. Le mécanisme du sommeil; 3. Le rêve; 4. Les perturbations du sommeil. Conclusions. Bibliographie sommaire. L. G.

Radfield, Alfred C. Quelques aspects du problème de l'évolution de la fonction respiratoire du sang. *Revue des questions scientifiques* 20, 38-54, 1931. ISIS

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Includes a history of blood transfusion. Reviewed by S. C. DYKE, *Nature* 126, 716-17, 1930.

Strünckmann, K. Der Ganzheits-Gedanke in der Ernährung. Vortrag, gehalten auf der Frühjahrs-Tagung der Naturärzte in Bad Harzburg (Frühjahr 1937). 20 p. ISIS

37. — PSYCHOLOGY (*human and comparative*)

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Müller, Georg Elias. Ueber die Farbenempfindungen. *Psychologische Untersuchungen.* Bd. 2, IX+214 p. Leipzig BARTH, 1930. ISIS

Murchison, Carl (ed.). A history of psychology in auto-biography. Vol. 3, By JAMES ROWLAND ANGELL, and others. XVII+327 p. (International University series in psychology). Worcester, Mass., Clark University Press, 1936. ISIS

Reviewed in *Nature* 140, 830, 1937.

Murchison, Carl. The psychological register. vol. 3, XII+1269 p. (International university series in psychology). Worcester, Mass., Clark University Press, 1932. ISIS

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Reviewed in *Nature* 129, 921-22, 1932.

Price, Harry. Confessions of a ghost-hunter. 396 p., 16 pl. London, PUTNAM, 1936. ISIS

Reviewed in *Nature* 137, 764, 1936.

Spearman, Charles. Psychology down the ages. XI+454 p.; VII+355 p. New York, MACMILLAN, 1937 ($7.50). ISIS

In the present two volumes Professor SPEARMAN has produced a very readable and original history of psychology. The work does not in any way compete with or replace the existing histories of psychology, for it does not represent a formal exposition of the whole course of psychology but rather a very personal discussion of the chief contributions which have affected the development of psychology, not the least significant among them being the author's own.

Professor SPEARMAN's own contribution to the development of psychology has lain entirely in the field of cognition (cf. *The nature of intelligence and the principles of cognition*, 1923, and *The abilities of man*, 1926), and the present work treats of psychology as seen through the mind of one who is chiefly interested in cognition. In a very definite sense the work is a very personal one, but is not the less attractive for being so. It is very clearly written and may be read by the untrained as well as by the student and professed psychologist with pleasure and with profit.

The critical analyses of psychological formulations, theories, and schools, from the earliest days to the present will be found particularly interesting and useful; while the fairly exhaustive exposition which the author gives of his own work is so much more lucid than anything he has hitherto written on the same subject that it must be regarded as a new work in its own right, to which students and others should be advised to go before they embark upon the attempt to acquaint themselves with the contents of Professor SPEARMAN's two earlier books. M. F. A.-M.

Sprott, W. J. H. General psychology. IX+446 p. New York, LONGMANS GREEN, 1937 ($2.75). ISIS

Intended for the general reader and the student this book gives a very lucid account of the whole field of general psychology, and makes rather good reading. M. F. A.-M.

Stern, William. General psychology. XII+589 p. New York, MACMILLAN, 1938 ($4.50). ISIS

An excellent translation by H. D. SPOERL of STERN's *Allgemeine Psychologie* which has been completely revised by the author (who is now happily established at Duke University). As is well known, STERN's work is both original and stimulating, and for these reasons, among others, his book deserves to be widely read by all who are in any way interested in the functioning and the organization of mind. M. F. A.-M.

Stevens, S. S. Psychology : the propaedeutic science. *Philosophy of science* 3, 90-103, 1936. ISIS

38. — ARCHAEOLOGY (*generalities, methods*)

HISTORY OF ARCHAEOLOGY AND ERUDITION

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Debenedetti, Salvador. L'ancienne civilisation des Barréales du nord-ouest Argentin (La Ciénega et la Aguada) d'après les collections privées et les documents de BENJAMIN MUNIZ BARETTO. 60 p., 68 pl. (Ars Americana, 2), Paris, VAN OEST, 1931. ISIS

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Dexter, T. F. G. (d. 1933) and **Dexter, Henry.** Cornish crosses, Christian and pagan. With some observations on the Tau cross, Thor's hammer, and the cult of the axe. XXXI+301 p., 190 fig. London, LONGMANS, GREEN, 1938 (21 sh., $8). ISIS

Very erudite study very well illustrated. The author's comparisons with Egypt, Etruria, the Aegaean world are more tantalizing than convincing. Such statements are these " The evidence of Egyptian culture in Cornwall is cumulative." (p. 66), " It is more than probable that at a very early period Etruscans came to Cornwall..." (p. 101), " The plaited work on Celtic crosses has its origin in entwined serpents " (p. 237), etc., are more dogmatic than the evidence warrants. Yet any lover of Cornwall (and I am one of them) will understand the author's bewitchment and sympathize with him. G. S.

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Reviewed by MAX PIEPER, *OLZ* 37, 351, 1934.

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Montell, Gösta. Dress and ornaments in ancient Peru : archaeological and historical studies. VIII+262 p., 3 pl. Göteborg, Elanders Boktryckeri, 1929. ISIS

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A translation of the author's well-known *Eine Weltgeschichte des Tanzes*, very readable and very attractive in its new garb. While by no means the great work of scholarship which some have claimed it to be, it is nonetheless a valuable contribution to the history and understanding of the dance, well illustrated and interestingly written. I note that W. D. HAMBLY's *Tribal dancing and social development* (London 1926) receives no mention. There is a list of references and an index. M. F. A.-M.

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39. — PREHISTORY

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Reviewed by V. GORDON CHILDE, *Antiquity* 11, 113-16, 1937.

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Grinsell, L. V. The ancient burial-mounds of England. 240 p., 24 pl. London, METHUEN, 1936. ISIS

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Reviewed by L. V. GRINSELL, *Antiquity* 11, 117-19, 1937.

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Explication admirable des principes de la science économique et de leurs perversions. J'espère que ce livre sera bientôt traduit en anglais. G. S.

Surányi-Unger, Theo. Geschichte der Wirtschaftsphilosophie. 70 p. (*Geschichte der Philosophie in Längsschnitten*, 1). Berlin, JUNKER und DÜNNHAUPT, 1931. ISIS

Wilkinson, T. W. From track to by-pass : a history of the English road. XVI+240 p., 39 pl. London, METHUEN, 1934. ISIS

Reviewed in *Nature* 134, 893, 1934.

43. — SOCIOLOGY, JURISPRUDENCE AND POSITIVE POLITY

Anuario de historia del derecho español. Tomo V. 557 p. (Junta para ampliación de estudios y investigaciones científicas. Centro de estudios históricos.). Madrid, Revista de Archivos, 1928. ISIS

Reviewed by ERNST MAYER, *DLZ* 3, 371-77, 1932.

Authority and the individual. Harvard tercentenary publications. VII+371 p. Cambridge, Harvard University Press, 1937. ISIS

Reviewed by ROBERT K. MERTON. *Isis* 28, 151-54, 1938.

Carrier, Elsé Haydon. Water and grass. A study in the pastoral economy of Southern Europe. XI+434 p. London, CHRISTOPHERS, 1932. ISIS

Cook, Thomas Ira. History of political philosophy from PLATO to BURKE. XVIII+725 p. (Prentice-Hall political science series). New York, PRENTICE-HALL, 1936. ISIS

Reviewed by C. H. MCILWAIN, *American historical review* 43, 670, 1938.

Emge, Carl August. Geschichte der Rechtsphilosophie. 73 p. (Gesch. d. philos. in Längsschnitten, hrsg. v. W. MOOG, H. 5). Berlin, JUNKER & DÜNNHAUPT, 1931. ISIS

Reviewed by ERIK WOLF, *DLZ* 3, 951-52, 1932.

Factors determining human behaviour. Harvard tercentenary publications. VII+168 p. Cambridge, Harvard University Press, 1937. ISIS

Reviewed by ROBERT K. MERTON, *Isis* 28, 151-54, 1938.

Gierke, Otto. Natural law and the theory of society 1500 to 1800. With a lecture on " The ideas of natural law and humanity " by

ERNST TROELTSCH. Translated, with an introduction by ERNEST BARKER. Vol. I & II. XCI+423 p. Cambridge, Univ. Press, 1934. ISIS

Reviewed by ALFRED SCHULTZE, *DLZ* 57, 2228-35, 1936.

Gurvitch, Georges. L'idée du droit social. Notion et système du droit social. Histoire doctrinale depuis le XVII^e siècle jusqu'à la fin du XIX^e siècle. 710 p. Paris, Libr. du Recueil Sirey, 1932. ISIS

Halbwachs, Maurice. Morphologie sociale. 208 p. Paris, COLIN, 1938 (15 fr.). ISIS

" Cet ouvrage traite de la forme matérielle des sociétés, telle que la géographie humaine et la démographie ou statistique de la population avaient commencé à l'étudier; étendue d'une population ou d'un groupe social, nombre et nature de ses parties, manière dont elles sont disposées sur le sol, migrations internes et de pays à pays, formes des agglomérations, grandes villes, habitations, etc... D'une façon remarquable, l'auteur a repris ces études et résultats surtout quantitatifs, et les a interprétés du point de vue de l'école sociologique française... C'est à la science de la population que l'auteur a consacré la plus grande partie de son livre : la population de la terre et des continents depuis trois ou quatre siècles, sa densité, les migrations, le sexe et l'âge, le renouvellement des générations (natalité, nuptialité, mortalité), la population et les subsistances; et il a mis l'accent sur la vie urbaine sous ses formes modernes, sur la civilisation nouvelle qu'elle a développée et ses conséquences démographiques."

Haldane, J. B. S. Heredity and politics. 202 p. New York, NORTON, 1938 ($2.50). ISIS

In this book, which is based on the Muirhead Lectures delivered at Birmingham University in February and March 1937, Professor HALDANE considers the relation between our knowledge of the genetics of human inheritance and social legislation; a relation which without benefit of a knowledge of genetics had occupied both PLATO and ARISTOTLE; and since the days of the latter it may safely be said that no more important pronouncement has been issued on the subject than this authoritative, humane, and lucidly written volume.

The chief importance of HALDANE's book lies not in the novelty of its facts, but in the author's treatment of them, and in his continued emphasis of the point that our present knowledge of human genetics does not justify the so-called eugenic legislative measures which have been so rashly introduced in and sanctioned by various modern states. The book is one which deserves to be very widely read. M. F. A.-M.

Hocart, Arthur Maurice. Kings and councillors : an essay in the comparative anatomy of human society. 306 p. (*Egyptian Uni-*

versity collection of works published by the faculty of arts, no. 12). Cairo, Egyptian University, 1936. ISIS

Reviewed by R. R. M., *Nature* 139, 653, 1937.

Holdsworth, Sir William Searle. A history of English law. Tables and index by EDWARD POTTON. IX+228 p. London, METHUEN, 1932. ISIS

Keller, Albert Galloway. Societal evolution : a study of the evolutionary basis of the science of society. Revised edition. IX+119 p. New York, MACMILLAN, 1931. ISIS

Reviewed by W. G. L. C., *Nature* 130, 979-81, 1932.

Lévy-Ullmann, Henri. The English legal tradition. Its sources and history. Translated from the French by M. MITCHELL and revised and edited by FREDERIC M. GOADBY. Foreword by Sir W. S. HOLDSWORTH. LVI+383 p. London, MACMILLAN, 1935. ISIS

McIlwain, Charles Howard. The growth of political thought in the West, from the Greeks to the end of the Middle Ages. VII+417 p. New York, MACMILLAN, 1932. ISIS

Reviewed by RAYMOND G. GETTELL, *American historical review* 38, 358-59, 1933.

MacIver, R. M. Society. XII+596 p. New York, FARRAR & RINEHART, 1937. ($3.50). ISIS

This book represents a rewriting, with substantial additions, of the author's well-known and widely used earlier work *Society : its structure and changes*, and represents a virtually new work more suited perhaps to the needs of the student than the earlier volume. Like everything that Professor MACIVER writes the book is distinguished by its clarity of expression and the efficiency of its presentation. It will, no doubt, establish itself as the leading textbook of sociology in the English language. M. F. A.-M.

Marvin, F. S. The new vision of man. 171 p. London, ALLEN & UNWIN, 1938. ISIS

To be reviewed in *Isis*.

Parry, Leonard Arthur. The history of torture in England. VIII+244 p. London, LOW, 1934. ISIS

Robson, William A. Civilisation and the growth of law : a study of the relations between men's ideas about the universe and the

institutions of law and government. XV+354 p. New York, MACMILLAN, 1935. ISIS

" The object of this book is to depict the interactions between people's ideas about the universe on the one hand, and the laws and government of mankind on the other. I have endeavoured to show how legal and political institutions have been influenced by magic, superstition, religion and science; and how these great forces have in turn been influenced by the law."

Reviewed by ALBERT GUÉRARD, sr., *American historical review* 41, 788, 1936

Sabine, George Holland. A history of political theory. XVI+797 p. (American political science series). New York, HOLT, 1937. ISIS

Reviewed by C. H. MCILWAIN, *American historical review* 43, 567-69, 1938.

Stern, Bernhard J. Frustration of technology. *Science and society* 2, 1-28, 1937. ISIS

" Whether technological innovations are incorporated, delayed or rejected is determined primarily by whether an economy is static, contracting or expanding; whether social stratification exists or is absent; and whether there is an anarchic or planned industrial order." In the Soviet Union " the financial hazards entailed by technological advance under an anarchic system of production built upon the demand for immediate profits on private investments, are eliminated by socialized planning." R. K. M.

44. — HISTORY OF CIVILIZATION

(General history, Historical methods, Biography and chronology)

American documentation institute. *Isis* 28, 98, 1938. ISIS

Berdrow, Wilhelm. Die Familie KRUPP in Essen von 1587 bis 1887. Mit Anhang : 13 genealogische Tabellen, entworfen und zusammengest. von FRITZ GERHARD KRAFT. 2 vols., 400 p., 13 tables. Essen, KRUPP, 1931. ISIS

Reviewed by KARL LOHMEYER, *DLZ* 3, 1286-88, 1932.

Berr, Henri. En marge de l'histoire universelle. XII+303 p. Paris, La Renaissance du Livre, 1934. ISIS

Reviewed by HÉLÈNE METZGER, *Archeion* 16, 463-64, 1934.

Budge, Sir Ernest Alfred Wallis. A history of Ethiopia (Nubia and Abyssinia). 2 vols. XXX+675 p., 49 pl., 31 ill., map. London, METHUEN, 1928. ISIS

Reviewed by MAURICE DE COPPET, *Journal des savants* 442-52, 1930.

Bury, John Bagnell. The idea of progress : an inquiry into its origin and growth. Introduction by CHARLES A. BEARD. XL+357 p. New York, MACMILLAN, 1932. ISIS

Reviewed by CARL BECKER, *American historical review* 38, 404-06, 1933.

Cartellieri, Otto. The court of Burgundy : studies in the history of civilisation. Translated by MALCOLM LETTS. XV+282 p., 25 pl. (The history of civilisation series). London, KEGAN PAUL, 1929. ISIS

Casson, Stanley. Progress and catastrophe. An anatomy of human adventure. 2nd ed. London, HARPER, 1937. ISIS

Clyde, William M'Callum. The struggle for the freedom of the press from CAXTON to CROMWELL. XVI+360 p. (St. Andrews university publication, 37). New York, Oxford University Press, 1934. ISIS

Reviewed by ORON JAMES HALE, *American historical review* 41, 338-40, 1936.

Coulton, G. G. Inquisition and liberty. XIII+354 p., pls. London, HEINEMANN, 1938 (15s.). ISIS

This book is timely as inquisitorial methods are reestablished in various countries of Europe. One cannot read this very moderate account without realizing not only their cruelty but also their utter futility. It is quite certain that the Inquisition of Spain was one of the main sources of the violent and tenacious anticlericalism of many Spaniards; it was one of the deep causes of the martyrdom of Spain today. G. S.

Cru, Jean Norton. Témoins : essai d'analyse et de critique des souvenirs de combattants édités en Français de 1915 à 1928. VIII+727 p. Paris, Les Etincelles, 1929. ISIS

Reviewed by RICHARD A. NEWHALL, *American historical review* 35, 612-13, 1930.

L'enseignement de l'histoire dans les écoles primaires. Rapports nationaux précédés d'un rapport général. Enquête de la Commission pour l'enseignement de l'histoire. *Bulletin of the International committee of historical sciences* 3, 319-480, 1931. ISIS

Fleming, John Arnold. Flemish influence in Britain. With a preface by R. B. CUNNINGHAME GRAHAM. In 2 volumes. Vol. 1, XX+402 p.; vol. 2, VIII+434 p. Glasgow, WYLIE, 1930. ISIS

Fueter, Eduard. Geschichte der neueren Historiographie. Dritte, um einen nachtrag vermehrte Auflage, besorgt von DIETRICH GERHARD und PAUL SATTLER. (Handbuch der mittelalterlichen und neueren Geschichte). XXII+670 p. Munich, OLDENBOURG, 1936. ISIS

Reviewed by FRANK J. MANHEIM, *American historical review* 42, 86, 1936.

Galbreath, Donald Lindsay. A treatise on ecclesiastical heraldry. Part 1. Papal heraldry. XX+118 p. Cambridge, HEFFER, 1930. ISIS

Gsell, Stéphane. Histoire et historiens de l'Algérie. Introduction de STÉPHANE GSELL. Ouvrage publié par les soins de la *Revue historique*. 426 p. (1830-1930. Collection du Centenaire de l'Algérie. IV : Archéologie et histoire). Paris, ALCAN, 1931. ISIS

Reviewed by R. HARTMANN, *DLZ* 3, 2432-34, 1932.

Hubert, Henri (1872-1927). Les Celtes depuis l'époque de La Tène et la civilisation celtique. XVII+369 p., 3 maps, pl. (tome XXI bis de la Bibliothèque de Synthèse historique; l'Évolution de l'humanité). Paris, 1932. ISIS

Reviewed by ADRIEN BLANCHET, *Journal des savants*, 225-27, 1933.

International bibliography of historical sciences (Internationale bibliographie der Geschichtswissenschaften). Fifth year 1930. Seventh year 1932. Edited for the International committee of historical sciences. CVII+514 p.; CVX+525 p. Washington, D.C., 1934. ISIS

Reviewed by HEINRICH SPROEMBERG, *DLZ* 6, 1878-80, 1935.

Johnson, Allen. Dictionary of American biography. 20 volumes. New York, SCRIBNER'S, 1928-36. ISIS

Julien, Ch.-André. Histoire de l'Afrique du Nord. Tunisie : Algérie : Maroc. With preface by STÉPHANE GSELL. XVI+882 p., 357 figs. (Bibliothèque historique). Paris, PAYOT, 1931. ISIS

Reviewed by E. J. HOLMYARD, *Journal of the royal Asiatic society*, 455-57, 1933.

Lehmann, Ernst Herbert. Geschichte des Konversationslexikons. 63 p., 36 fig. Leipzig, BROCKHAUS, 1934. ISIS

Lovejoy, Arthur O. The historiography of ideas. *Proceedings of the American philosophical society* 78, 529-43, 1938. ISIS

Martène, Dom Edmond (1654-1739). Histoire de la congrégation de Saint-Maur. Introduction et des notes par G. CHARVIN. 3 vol. Paris, PICARD, 1928-37. ISIS

(Marvin, Francis S.). The unity history schools. *Isis* 28, 96-8, 1938. ISIS

Perrier, Paul. L'Unité humaine. Histoire de la civilization et de l'esprit humain. 404 p. Paris, ALCAN, 1931. ISIS

Pirenne, Henri. (1862-1935). Bibliographie de l'histoire de Belgique. Catalogue méthodique et chronologique des sources et des ouvrages principaux relatifs à l'histoire de tous les Pays-Bas jusqu'en 1598 et à l'histoire de Belgique jusqu'en 1914. 3. Aufl., hrsg. unter Mitarbeit von H. NOWÉ und H. OBREEN. VIII+440 p. Brussels, LAMERTIN, 1931. ISIS

Reviewed by H. SPROEMBERG, *DLZ* 3, 1280-84, 1932.

Riches, Phyllis M. An analytical bibliography of universal collected biography comprising books published in the English tongue in Great Britain and Ireland, America and the British Dominions. IX+709 p. London, Library Association, 1934. ISIS

Reviewed by R. C. ARCHIBALD, *Scripta mathematica* 3, 178-79, 1935.

Sartiaux, Félix. La civilisation. 224 p. Paris, COLIN, 1938 (15 fr.). ISIS

" On parle souvent de ' La civilisation,' sans savoir au juste ce que l'on entend par là. Pour échapper à des jugements subjectifs et particuliers, on a récemment proposé de détacher l'idée de civilisation de la notion de niveau, de progrès, en lui donnant un sens général, celui des *caractères* que présente la vie d'un groupe ou d'une époque. L'auteur de cet ouvrage esquisse d'abord un bref historique critique de ces conceptions. La théorie évolutive reste pour lui fondamentale, à condition de distinguer *ce qu'est* la civilisation de la question de savoir si elle est bonne ou mauvaise, et de l'envisager dans l'ensemble, en évitant de la lier à des séries partielles de faits. L'idée de *la civilisation* ne s'oppose pas, pour lui, à celle *des civilisations*. C'est ce qu'il montre par l'analyse de la notion même, puis par un vaste tableau où le progrès est strictement limité à certaines séries évolutives, nettement et objectivement définies, réparties entre quelques grands groupes distincts de fonctions sociales (technique, pensée, jeu et art, organisation et cohésion collectives). Les corrélations permettent de dégager un mouvement d'ensemble, et, par suite, l'idée générale de la civilisation."

Schneider, Hermann. The history of world civilization. From prehistoric times to the Middle Ages. Translated by MARGARET M. GREEN. 2 volumes. Vol. 1, XIV+360 p.; vol. 2, p. 363-908. London, ROUTLEDGE, 1931. ISIS

Smith, Preserved. A history of modern culture. Vol. 2 : The enlightenment, 1687-1776. VII+703 p. New York, HOLT, 1934. ISIS

Reviewed by JAMES HARVEY ROBINSON, *American historical review* 40, 126-28, 1934.

Toynbee, Arnold Joseph. A study of history. Vol. 1, XVI+476 p.; vol. 2, VII+452 p.; vol. 3, VI+552 p. (Issued under the auspices of the Royal institute of international affairs). London, Oxford University Press, 1934. ISIS

Reviewed by JULES MENKEN, *Nature* 135, 636-38, 1935.

Wirth, Herman. Der Aufgang der Menschheit. Untersuchungen zur Geschichte der Religion, Symbolik und Schrift der atlantisch-nordischen Rasse. Vol. 1. Die Grundzüge. 632 p., 68 fig., 11 pl. 28 ills. Jena, DIEDERICHS, 1928. ISIS

Reviewed by ADOLF MEYER, *Archiv für Geschichte der Mathematik, der Naturwissenschaften und der Technik*, 12, 433-41, 1930.

45. — HISTORY OF ART

(Art and science, Iconography, Arts and crafts)

Birkhoff, George D. Aesthetic measure. Cambridge, Harvard University Press, 1933. ISIS

Reviewed by DERRICK N. LEHMER, *Scripta mathematica* 2, 55-9, 1933.

Bliss, Douglas Piercy. A history of wood engraving. XVI+263 p., 120 ills. London, DENT, 1928. ISIS

Cellier, Alexandre; Bachelin, Henri. L'orgue. Ses éléments, son histoire, son esthétique. Préface de C. M. WIDOR. 255 p., ill. Paris, DELAGRAVE, 1933. ISIS

(Coculesco), Pius Servien. Principes d'esthétique : problèmes d'art et langage des sciences. VIII+228 p. Paris, BOIVIN, 1935. ISIS

Reviewed by HÉLÈNE METZGER, *Archeion* 17, 342-43, 1935.

Coulton, George Gordon. Art and the reformation. 622 p., 26 pl., 89 figs. New York, KNOPF, 1928. ISIS

Reviewed by AMY DUNLAP, *Art bulletin* 11, 295-96, 1929.

Einstein, Alfred. Beispielsammlung zur Musikgeschichte. 4. wesentlich erweit. Aufl. IV+152 p. Leipzig, TEUBNER, 1930. ISIS

Reviewed by DÉNES V. BARTHA, *DLZ* 2, 1952-53, 1931.

Errera, Isabelle. Répertoire abrégé d'iconographie. I-III. Wetteren, DE MEESTER, 1929-32. ISIS

Funck-Hellet, Ch. Les œuvres peintes de la Renaissance italienne et le nombre d'or. 56 p., ill. Paris, LE FRANÇOIS, 1932. ISIS

Galpin, Francis W. A textbook of European musical instruments. Their origin, history, and character. London, WILLIAMS and NORGATE, 1937. ISIS

Heinitz, Wilhelm. Strukturprobleme in primitiver Musik. IV+258 p. Hamburg, FRIEDERICHSEN, DE GRUYTER, 1931. ISIS

Reviewed by ROBERT LACH, *DLZ* 2, 1760-62, 1931.

Klinckowstroem, Graf Carl von. Zur Geschichte und Psychologie der Taschenspielkunst. 8 p., 2 ills. Sonderbeilage der Magie, Febr. 1930. ISIS

Lukomskiĭ, Georgiĭ Kreskent'evich. I maèstri della architettura classica da VITRUVIO allo SCAMOZZI : con 350 illustrazioni. Traduzione a cura di LINO CAPPUCCIO. XIII+455 p. Milano, HOEPLI, 1933. ISIS

Lunn, Arnold. A history of ski-ing. XV+492 p. Oxford, University Press, 1927. ISIS

Pelliot, Marianne. Verres anciens. VIII+153 p., 48 pl. Paris, VAN OEST, 1929. ISIS

REVIEWED by GUSTAV E. PAZAUREK, *DLZ* 1, 699-702, 1930.

Pessoa, Alberto. O quadro dos SS. Cosme e Damião do Museu Machado de Castro. Miscelânea de estudos em honra de D. CAROLINA MICHAËLIS DE VASCONCELLOS. Coimbra, Imprensa da Universidade, 1930. ISIS

Porter, Arthur Kingsley (1883-1933). The crosses and culture of Ireland. XXIII+143 p., 276 fig. (Five lectures delivered at the Metropolitan Mus. of art, February and March 1930). New Haven, Yale Univ. Press, 1931. ISIS

Reviewed by PHILIPP SCHWEINFURTH, *DLZ* 57, 892-96, 1936.

Price, Frank Percival. The carillon. Preface by HERBERT AUSTIN FRICKER. Drawings by LEONARD ELDON SHORE. XI+228 p., 38 pl. Oxford, University Press, 1933. ISIS

Rojo, Casiano; Prado, Germán. El canto mozárabe. Estudio histórico-crítico de su antigüedad y estado actual. 156 p. Barcelona, Biblioteca de Cataluña, 1929. ISIS

Reviewed by WALTER MUIR WHITEHILL, jr., *Speculum* 7, 153-55, 1932.

Söhner, Leo. Die Geschichte der Begleitung des gregorianischen Chorals in Deutschland, vornehmlich im 18. Jahrhundert. XVI+213 p. (Veröffentl. d. Gregorian. Akad. zu Freiburg i. d. Schweiz, hrsg. v. PETER WAGNER, H. 16). Augsburg, FILSER, 1931. ISIS

Reviewed by DÉNES V. BARTHA, *DLZ* 3, 653-55, 1932.

Sudeck, Elisabeth. Bettlerdarstellungen vom Ende des XV. Jahrhunderts bis zu REMBRANDT. 122 p., 24 pl. (*Studien z. dtsch. Kunstgesch.* H. 279). Strassburg, HEITZ, 1931. ISIS

Reviewed by K. K. EBERLEIN, *DLZ* 4, 458-59, 1933.

Thorpe, William Arnold. A history of English and Irish glass. In two vols., XV+372 p.; XII+168 p., pl. London, Medici society, 1929. ISIS

46. — HISTORY OF LANGUAGE, WRITING AND LITERATURE

Arntz, Helmut. Handbuch der Runenkunde. XVII+329 p., 15 pl. (*Sammlg. kurzer Grammatiken german. Dialekte.* 3). Halle a.S., NIEMEYER, 1935. ISIS

Reviewed by R. MEISSNER, *DLZ* 58, 1259-64, 1937.

Bally, Charles. Linguistique générale et linguistique française. VIII+410 p. Paris, LEROUX, 1932. ISIS

Reviewed by ERNST GAMILLSCHEG, *DLZ* 5, 253-68, 1934.

Balogh, Josef. Voces paginarum : Beiträge zur Geschichte des lauten Lesens und Schreibens. 66 p. (*Philologus*, 82, 1 and 2). Leipzig, DIETERICH, 1927. ISIS

Reviewed by W. B. SEDGWICK, *Speculum* 3, 116-17, 1928.

Battelli, Giulio. Lezioni di palaeografia. X+227 p. (Pont. scuola vaticana di paleografia e diplomatica). Vatican City, 1936. ISIS

Reviewed by CHARLES H. BEESON, *American historical review* 43, 574-75, 1938.

Bloomfield, Leonard. Language. IX+564 p. New York, HOLT, 1933. ISIS

Reviewed by FRANKLIN EDGERTON, *Journal of the American oriental society* 53, 295-97, 1933.

Bowman, William Dodgson. What is your surname? Surnames : their origin and history. 317 p. London, FABER and FABER, 1932. ISIS

Brunot, Ferdinand. Histoire de la langue française des origines à 1900. 9 vols. Paris, COLIN, 1905-37. ISIS

Clodd, Edward. The story of the alphabet. IX+209 p. New York, Appleton-Century, 1938 ($1.25). ISIS

This excellent volume was originally published in 1900, and it is now re-issued with a foreword by GEORGE H. MCKNIGHT. As Professor MCKNIGHT points out, though the increase in our knowledge relating to the origins of the alphabet have not been inconsiderable during the interim, CLODD's little book still remains " a most convenient compendium of authentic information." No better introduction to the origin and development of writing could be put into the hands of the general reader. M. F. A.-M.

Cornish, Vaughan. Borderlands of language in Europe and their relation to the historic frontier of Christendom. VII+305 p., 15 maps. London, SIFTON, PRAED, 1936. ISIS

Correia, João da Silva. Algumas observações num domínio da história da língua portuguesa. *Petrus Nonius* 1, 49-51, 1937. ISIS

Ernout, Alfred; Meillet, Antoine. Dictionnaire étymologique de la langue latine. Histoire des mots. XIX+1108 p. Paris, KLINCKSIECK, 1932. ISIS

Detailed review by F. SPECHT, *DLZ* 3, 536-48, 1932.

Figueiredo, Fidelino de. Historia de la literatura Portuguesa; traducción del Sr. marqués DE LOZOYA, 391 p., 16 pl. Barcelona, Colleccion Labor (1927). ISIS

Fossey, Charles. Notices sur les caractères étrangers anciens et modernes, rédigées par un groupe de savants. X+326 p. Paris, Imprimerie nationale, 1927. ISIS

Reviewed by E. DHORME, *Revue de l'histoire des religions* 107, 224, 1933.

Gardiner, Alan Henderson. The theory of speech and language. X+332 p. Oxford, Clarendon Press, 1932. ISIS

Reviewed by N. B. HUNTER, *Antiquity* 7, 120-22, 1933.

Gordon, Eric Valentine. An introduction to old Norse. LXXXXIV+386 p., front., ills., maps. Oxford, Clarendon Press, 1927. ISIS

Graff, Willem Laurens. Language and languages. An introduction to linguistics. XLVI+487 p. London, APPLETON, 1932. ISIS

Iordan, Iorgu. An introduction to romance linguistics. Its schools and scholars. Revised, translated and in parts recast by JOHN ORR. London, METHUEN, 1937. ISIS

Jelínek, Hanuš. Histoire de la littérature tchèque, des origines à 1850. Paris, Éditions du Sagittaire, 1930-35. ISIS

Jensen, Hans. Die Schrift in Vergangenheit und Gegenwart. VI+418 p., 445 fig. Glückstadt, AUGUSTIN, 1935. ISIS

Reviewed by G. v. SELLE, *OLZ* 39, 489-91, 1936.

Jorgenson, Theodore. History of Norwegian literature. XIII+559 p. New York, MACMILLAN, 1933. ISIS

Reviewed by L. M. L., *American historical review* 39, 373, 1933.

Lohmann, Johannes. Genus und sexus. Eine morphologische Studie zum Ursprung der indogermanischen nominalen Genus-Unterscheidung. 94 p. (*Ergänzungshefte z. Zeitschr. f. vergl. Sprachforschung auf d. Gebiete d. indogerman. Sprachen.* Nr. 10). Göttingen, VANDENHOECK & RUPRECHT, 1932. ISIS

Reviewed by ERNST FRAENKEL, *DLZ* 3, 979-81, 1932.

Macaulay, T. C. Interlanguage. Artificial languages. By J. A.

SMITH. With an introduction by ELIZABETH DARYUSH. p. 453+77. S. P. E. tract, no. XXXIV). Oxford, Clarendon Press, 1930. ISIS

Meillet, Antoine. Introduction à l'étude comparative des langues indo-européennes, 7e éd. refondue. XIV+514 p. Paris, HACHETTE, 1934. ISIS

Reviewed by EDUARD HERMANN, *DLZ* 6, 317-20, 1935.

Millares, Carlo Augustin. Paleografía española : ensayo de una historia de la escritura en España desde el siglo VIII al XVII. Vol. 1 359 p., 39 fig., 16 pl.; vol. 2, 87 facs., 131 p. (Colección labor, vols. 192-194). Barcelona, Editorial Labor, 1929. ISIS

Reviewed by CHARLES UPSON CLARK, *Speculum* 454, 1930.

Sattler, Paul; Selle, Götz von. Bibliographie zur Geschichte der Schrift bis in das Jahr 1930. XX+234 p. (*Archiv für Bibliographie*, Beiheft 17). Linz a. d., WINKLER, 1935. ISIS

Reviewed by H. JENSEN, *OLZ* 39, 674-76, 1936.

Schmidt-Rohr, Georg. Die Sprache als Bildnerin der Völker. Eine Wesens- und Lebenskunde der Volkstümer. 418 p. (*Schriften d. Dtsch. Akad.* 12). Jena, DIEDERICHS, 1932. ISIS

Reviewed by FRIEDRICH PANZER, *DLZ* 3, 2262-69, 1932.

Vossler, Karl. The spirit of language in civilization. Translated by OSCAR OESER. VII+247 p. (International library of psychology, philosophy and scientific method). London, KEGAN PAUL, 1932. ISIS

Reviewed in *Nature* 131, 152, 1933.

Wartburg, Walther von. Evolution et structure de la langue française. VIII+256 p. Leipzig, TEUBNER, 1934. ISIS

Reviewed by ADOLF ZAUNER, *DLZ* 5, 1116-18, 1934.

47. — HISTORY OF MORALS

(*Moral organization of society*)

Bayet, Albert. Histoire de la morale en France. T. II, La morale païenne à l'époque gallo-romaine. 592 p. Paris, ALCAN, 1931. ISIS

Suite de l'ouvrage dont le T. 1 a été signalé dans *Isis* 17, 605.

Haldane, John Burdon Sanderson. Science and ethics : CONWAY memorial lecture delivered at Essex Hall, Essex Street, Strand, W.C. on April 18, 1928. 46 p. London, WATTS, 1928. ISIS

Inge, William Ralph. Scientific ethics : being the third NORMAN LOCKYER lecture, delivered on November 21, 1927 at 4 P. M. in the Hall of the Goldsmiths' Company, London. 20 p. London, British science guild, 1927. ISIS

Loisy, Alfred. Y a-t-il deux sources de la religion et de la morale? VIII+204 p. Paris, NOURRY, 1933. ISIS

Reviewed by E. DHORME, *Revue de l'histoire des religions* 109, 220-29, 1934.

Wentscher, Max. Geschichte der Ethik. 113 p. (*Geschichte der Philosophie in Längsschnitten*, 3). Berlin, JUNKER u. DÜNNHAUPT, 1931. ISIS

48. — HISTORY OF PHILOSOPHY

(*See also above* 18. *Philosophy of science*)

Bradley, Francis Herbert (1846-1924). Collected essays, 2 vols. 708 p. Oxford, Clarendon Press, 1935. ISIS

Reviewed by RUDOLF METZ, *DLZ* 6, 1813-15, 1935.

Brunner, Peter. Probleme der Teleologie bei MAIMONIDES, THOMAS VON AQUIN und SPINOZA. (*Beiträge zur Philosophie*, 13). XII+139 p. Heidelberg, WINTER, 1927. ISIS

(Cassirer, Ernst). Philosophy and history. Essays presented to ERNST CASSIRER. Edited by RAYMOND KLIBANSKY and H. J. PATON. Oxford University Press, New York, 1936. ISIS

Cioffari, Vincenzo. Fortune and fate from DEMOCRITUS to St. THOMAS AQUINAS. VIII+130 p. New York, Columbia University, 1935. ISIS

Reviewed by HOWARD R. PATCH, *Speculum* 11, 394-97, 1936.

Cleugh, Mary Frances. Time and its importance in modern thought. Foreword by L. SUSAN STEBBING. London, METHUEN, 1937. ISIS

Driesch, Hans. Man and the universe. Translated by W. H. JOHNSTON. 172 p. London, ALLEN and UNWIN, 1929. ISIS

Garcia de Brato, Rogiero. La pensée philosophique à travers les âges. vol. 1, 242 p. Paris, VRIN, 1931. ISIS

Losskiĭ, Nikolaĭ Onufrĭevich. The world as an organic whole. Translated from the Russian by NATALIE A. DUDDINGTON. VI+199 p. Oxford, University Press, 1928. ISIS

Mead, George Herbert (1863-1931). The philosophy of the act. Edited, with introduction, by CHARLES W. MORRIS, in collaboration with JOHN M. BREWSTER, ALBERT M. DUNHAM, and DAVID L. MILLER. LXXXIV+696 p., frontispiece. University of Chicago Press, 1938. ISIS

To be reviewed in *Isis*.

Poirier, René. Essai sur quelques caractères des notions d'espace et de temps. 387 p. Paris, VRIN, 1931. ISIS

Reviewed by A. KOSCHEWNIKOFF, *DLZ* 4, 12-17, 1933.

Robertson, John Mackinnon. A history of freethought. Ancient and modern, to the period of the French Revolution. Fourth edition, revised and expanded. 2 vols. London, WATTS, 1936. ISIS

Stenzel, Julius. Studien zur Entwicklung der platonischen Dialektik von SOKRATES zu ARISTOTELES : arete und diaresis. Mit einem Anhang. Literarische Form und philosophischer Gehalt des Platonischen Dialoges. 2. erweit. Aufl. VIII+208 p. Leipzig, TEUBNER, 1931. ISIS

Reviewed by PAUL HELMS, *DLZ* 3, 485-89, 1932.

Whitehead, Alfred North. The function of reason. V+72 p. (Louis Clark Vanuxem Foundation lectures delivered at Princeton University, March 1929). Princeton, N.J., Princeton University Press, 1929. ISIS

Wundt, Max. Geschichte der Metaphysik. 123 p. (*Geschichte der Philosophie in Längsschnitten*, 2). Berlin, JUNKER u. DÜNNHAUPT, 1931. ISIS

49. — HISTORY OF RELIGION (*science and religion*)

Allier, Raoul. La psychologie de la conversion, chez les peuples non civilisés. 2 vols., 596 p.; 512 p. Paris, PAYOT, 1925. ISIS

Bauer, Walter. Rechtgläubigkeit und Ketzerei im ältesten Christentum. VII+247 p. (*Beiträge z. histor. Theol.* 10). Tübingen, MOHR, 1934. ISIS

Reviewed by MARTIN DIBELIUS, *DLZ* 6, 443-48, 1935.

Bavink, Bernhard. Science and God. Translated by H. STAFFORD HATFIELD. IX+174 p. London, BELL, 1933. ISIS

Bulgakov, Sergei Nikolaevich. L'orthodoxie. 269 p. Paris, ALCAN, 1932. ISIS

Reviewed by M. LOT-BORODINE, *Revue de l'histoire des religions* 107, 209-13, 1933.

Caspar, Erich. Geschichte des Papsttums von den Anfängen bis zur Höhe der Weltherrschaft. Bd. II : Das Papsttum unter byzantinischer Herrschaft. XIV+826 p. Tübingen, MOHR, 1933. ISIS

Reviewed by H. v. CAMPENHAUSEN, *DLZ* 5, 1234-39, 1934.

Chaumartin, Henri. L'image de Saint-Antoine le Grand. Essai de critique iconographique. *Bull. de la société franç. d'histoire de la médecine* 26, 333-85, 413-41, figs., 1932 (to be cont'd). ISIS

Costelloe, B. F. C. The church and the catacombs. 32 p. London, Catholic truth society, 1931. ISIS

Darwin, Randolph Charles. Die Entwicklung des Priestertums und der Priesterreiche oder Schamanen, Wundertäter und Gottmenschen als Beherrscher der Welt. Ein Warnruf an alle freiheitliebenden Völker. VIII+416 p., 85 fig. Leipzig, WEICHER, 1929. ISIS

Reviewed by G. VAN DER LEEUW, *DLZ* 3, 1729-30, 1932.

Davidson, Martin. The heavens and faith. With a foreword by Sir FRANK W. DYSON. XV+162 p. London, WATTS, 1936. ISIS

Reviewed by J. C. H., *Nature* 138, 227, 1936.

Dingle, Reginald James. The faith and modern science. XVII+195 p. London, BURNS, OATES and WASHBOURNE, 1935. ISIS

Reviewed by T. G., *Nature* 137, 92, 1936

Douie, Decima Langworthy. The nature and the effect of the heresy of the Fraticelli. XIX+292 p. Manchester, University Press, 1932. ISIS

Feibleman, James. Christianity, Communism and the ideal society. A philosophical approach to modern politics. 419 p. London, ALLEN and UNWIN, 1937. ISIS

Fosseyeux, Marcel. Les saints protecteurs contre la " male " mort au moyen-âge et à la renaissance. *Bull. de la soc. franç. d'hist. de la méd.* 29, 339-49, 1935. ISIS

Fülöp-Miller. René. The power and secret of the Jesuits. Translated by F. S. FLINT and D. F. TAIT. XVIII+523 p. London, PUTNAM, 1930. ISIS

Gemelli, Agostino. The Franciscan message to the world. Translated by HENRY LOUIS HUGHES. XX+336 p. London, BURNS, OATES, 1934. ISIS

Gowen, Herbert H. A history of religion. IV+698 p. London, Society for promoting Christian knowledge, 1934. ISIS

Reviewed by MARGARET SMITH, *Journal of the Royal Asiatic society* 417-19, 1935.

Heiler, Friedrich. Prayer. A study in the history and psychology of religion. Translated and edited by SAMUEL MCCOMB. With the assistance of J. EDGAR PARK. XXVIII+376 p. Oxford, University Press, 1932. ISIS

Hicks, George Dawes. The philosophical bases of theism. 272 p. (Hibbert lectures). London, ALLEN and UNWIN, 1937. ISIS

Reviewed by J. C. H., *Nature* 140, 485, 1937.

Hooke, Samuel Henry. The labyrinth. Further studies in the relation between myth and ritual in the ancient world. XIV+288 p. London, Society for promoting Christian knowledge, 1935.

Reviewed by MAURICE H. FARBRIDGE, *Jewish quarterly review* 28, 149-53, 1937.

Inge, Dean. God and the astronomers : containing the Warburton lectures 1931-1933. XIII+308 p. London, Longmans, GREEN, 1933. ISIS

Reviewed by R. A. S., *Nature* 132, 619-20, 1933.

James, Edwin Oliver. Origins of sacrifice : a study in comparative religion. XVI+314 p. London, MURRAY, 1933. ISIS

Reviewed in *Nature* 132, 587, 1933.

Kenyon, Sir Frederic George. The Chester Beatty Biblical papyri. Descriptions and texts of twelve manuscripts on papyrus of the Greek Bible. I, General introduction; II, The Gospels and Acts. London, WALKER, 1933. ISIS

Reviewed by PAUL-LOUIS COUCHOUD, *Revue d'histoire des religions* 109, 207-19, 1934.

Kenyon, Sir Frederic George. The text of the Greek Bible. A students' handbook. 264 p. London, DUCKWOTH, 1937. ISIS

Latourette, Kenneth Scott. A history of the expansion of Christianity. Vol. I, The first five centuries. 412 p., 1 map. New York, HARPER, 1937. ISIS

Reviewed in *Journal of the American oriental society* 57, 438-40, 1937.

La Vallée Poussin, Louis de. La morale bouddhique. Preface by ÉMILE SENART. XVI+256 p. Paris, Nouvelle Librairie nationale, 1927. ISIS

Loisy, Alfred. Le Mandéisme et les origines chrétiennes. 180 p. Paris, NOURRY, 1934. ISIS

Reviewed by J. SCHNITZER, *DLZ* 5, 1212, 1934 and by E. DHORME, *RHR* 109, 229-33, 1934.

Loisy, Alfred. Y a-t-il deux sources de la religion et de la morale? 204 p. Paris, NOURRY, 1933. ISIS

Reviewed by J. SCHNITZER, *DLZ* 4, 2017-20, 1933.

Lunn, Arnold; Haldane, J. B. S. Science and the supernatural. A correspondance between ARNOLD LUNN and J. B. S. HALDANE. VII+412 p. London, EYRE and SPOTTISWOODE, 1935. ISIS

Reviewed by J. C. HARDWICK, *Nature* 136, 288, 1935.

Mason, Frances (Baker). The great design : order and progress in nature. Introduction by Sir J. ARTHUR THOMSON. 324 p. London, DUCKWORTH, 1934. ISIS

Mater, André. Les Jésuites. 200 p., 8 pl. (Collection Christianisme). Paris, RIEDER, 1932. ISIS

Reviewed by PAUL ALPHANDÉRY, *Revue de l'histoire des religions* 106, 471, 1932.

McCabe, Joseph. The story of religious controversy. Edited with an introduction by E. HALDEMAN-JULIUS. XVIII+623 p. Boston, STRATFORD, 1929. ISIS

Reviewed by SAMUEL S. COHON, *Jewish quarterly review* 23, 197-201, 1932.

Parker, John William. The idea of salvation in the world's religions. VIII+259 p. London, MACMILLAN, 1935. ISIS

Pettazzoni, Raffaele. La confessione dei peccati. Vol. 2 : Egitto-Babilonia-Israele-Arabia meridionale. XVI+365 p. (*Storia delle religioni a cura di R.P.*, 2). Bologna, ZANICHELLI, 1935. ISIS

Reviewed by HOWARD T. GAY, *OLZ* 38, 604-06, 1935.

Rupprecht, Ernst. Cosmae et Damiani Sanctorum medicorum vitam et miracula e codice Londinensi edidit. XV+82 p. (*Neue deutsche Forschungen, Abt. Klass. Philologie*, 1). Berlin, JUNKER & DÜNNHAUPT, 1935. ISIS

Reviewed by FRIEDRICH PFISTER, *OLZ* 39, 87-8, 1936.

Schmidt, Wilhelm. Der Ursprung der Gottesidee. Eine historisch-kritische und positive Studie. II. Tl. : Die Religionen der Urvölker. 4. Bd. : Die Religionen der Urvölker Afrikas. 5. Bd. : Nachträge zu den Religionen der Urvölker Amerikas, Asiens und Australiens. XXXII+821 p.; XXXVIII+921 p. 6. Bd. : Endsynthese der Religionen der Urvölker Amerikas, Asiens, Australiens, Afrikas. Münster i.W., ASCHENDORFF, 1933-35. ISIS

Reviewed by FRIEDRICH HEILER, *DLZ* 6, 1107-09, 1935.

Shryock, John Knight. Desire and the universe, a study of religions. 352 p. Philadelphia, Centaur Press, 1935. ISIS

Reviewed by GEORGE A. BARTON, *Journal of the American oriental society* 55, 479-82, 1935.

Simpson, James Young. The garment of the Living God. Studies in the relations of science and religion. With a memoir by G. F. BARBOUR. 281 p. London, HODDER and STOUGHTON, 1934. ISIS

Stewart, John. Nestorian missionary enterprise. The story of a church on fire. With foreword by SAMUEL M. ZWEMER. XXXIV+352 p. Edingburgh, T. and T. CLARK, 1928. ISIS

Turmel, Joseph. Histoire des dogmes. 6 volumes. Paris, RIEDER, 1931-36. ISIS

Vaganay, Leon. An introduction to the textual criticism of the New Testament. 208 p. Translated by B. V. MILLER. London, SANDS, 1937. ISIS

Verrill, Alpheus Hyatt. The Inquisition. Illustrated. IX+353 p. New York, APPLETON, 1931. ISIS

Reviewed in *Jewish Quarterly review* 22, 442, 1932.

Walker, Leslie Joseph (S. J.). Science and revelation. VII+87 p. London, OATES, 1932. ISIS

Walter, Johannes von. Die Geschichte des Christentums. I. Halbbd.: Das Altertum. V+238 p. Gütersloh, BERTELSMANN, 1932. ISIS

Reviewed by HELMUT LOTHER, *DLZ* 4, 2115-18, 1933.

Waterhouse, Eric Strickland. The philosophical approach to religion. 231 p. (FERNLEY-HARTLEY lecture, 1933). London, Epworth Press, 1933. ISIS

Weiss, Johannes (1863-1914). The history of primitive Christianity. Completed by RUDOLF KNOPF. Translated by four friends and edited by FREDERICK G. GRANT. 2 volumes. London, MACMILLAN, 1937. ISIS

VII. — MEDICINE

50. — HISTORY, ORGANIZATION, AND PHILOSOPHY OF MEDICINE

Beltran, Juan Ramon. Publicaciones de la catedra de historia de la medicina, dirigidas por el. Tomo I. Conferencias y trabajos. 294 p. Buenos Aires, Imprenta de la Universidad, 1938. ISIS

Fischer, I. Medizinische Preisfragen. *Janus* 42, 25-43, 2 pl., 1938. ISIS

Haferkamp, Hans Joachim. Die Internationalen medizinischen Kongresse und der Weltkrieg. 59 p. (*Abhandlungen zur Geschichte der Medizin und der Naturwissenschaften* H. 22). Berlin, EBERING, 1937. ISIS

Himes, Norman E. Forerunners of the modern condom. *Janus* 42, 1-6, 10 fig., 1938. ISIS

Inlow, William DePrez. The philosophy of medicine. *Medical life* 44, 399-434, 1937. ISIS

Milestones in medicine. IX+276 p. New York, Appleton-Century, 1938 ($2.00). ISIS

This volume consists of the popularly attended laity lectures delivered in the 1936-37 season at the New York Academy of medicine. There is a brief *Introduction* by JAMES ALEXANDER MILLER, president of the Academy; SMITH ELY JELLIFFE discusses *The historical background of psychiatry*, and CHARLES R. STOCKARD *The mechanisms of heredity*. In an unusually attractive essay KARL VOGEL tells the story of *Medicine at sea in the days of sail*. FREDERICK TILNEY gives an illuminating account of *The evolution of the brain*, and in perhaps the most interesting essay from the point of view of the readers of this journal HENRY E. SIGERIST rounds out a very stimulating excursus on *The history of medical history* with an admirable emphasis upon the socio-economic approach to the study of the history of medicine. It is a great pleasure to learn that Dr. SIGERIST is at this moment engaged upon a history of medicine approached from just this point of view. Its appearance is eagerly awaited. The concluding essays are *The history of leprosy* by NEWTON E. WAYSON, and *The story of the glands of internal secretion*, by WALTER TIMME. M. F. A.-M.

Murray, D. Stark. Science fights death. X+149 p., 18 fig. London, WATTS, 1936 (2-6). ISIS

A popular but quite inclusive survey of the present status of medical warfare against communicable diseases of bacterial, parasitic, or virus origin, with comment on hormones, vitamins, cancer, industrial diseases, and preventive medicine. C. A. K.

Pusey, William Allen. Giants of medicine in pioneer Kentucky, a study of influences for greatness. *Medical life* 45, 35-64, 1938. ISIS

San Francisco. The division of medical history of the University of California medical school, series of talks on the medical history of California. *Isis* 28, 99, 1938. ISIS

Seward, Blanton P. Pioneer medicine in Virginia. *Annals of medical history* 10, 61-70, 2 fig.; 169-87, 1938. ISIS

Van Esso, I. Hollandsche artsen in Russischen hof- en staatsdienst in de 16e, 17e en 18e eeuw. *Bijdragen tot de geschiedenis der geneeskunde* 18, 40-50, 1938. ISIS

Wittmann, Fritz. Der Arzt im Spiegelbild der deutschen schöngeistigen Literatur seit dem Beginn des Naturalismus. 133 p. (*Abhandlungen zur Geschichte der Medizin und Naturwissenschaften*, 18). Berlin, EBERING, 1936. ISIS

51. — EPIDEMIOLOGY, HISTORY OF SPECIAL DISEASES PUBLIC HEALTH AND SOCIAL MEDICINE

Berg, Alexander. Der Krankheitskomplex der Kolik- u. Gebärmutterleiden in Volksmedizin und Medizingeschichte unter besonderer Berücksichtigung der Volksmedizin in Ostpreussen. Ein Beitrag zur Erforschung volkstümlicher Krankheitsvorstellungen. 195 p. (*Abhandlungen zur Geschichte der Medizin und der Naturwissenschaften*, H. 9). Berlin, EBERING, 1935. ISIS

Flaxman, Nathan. Historical aspects of mitral stenosis. *Medical life* 45, 3-19, 1938. ISIS

Keizô Doi. *Sekai bidoku shi* (History of syphilis). 200 p., pl., illus., maps. Appendix 1 : Bibliography, 35 p. Appendix 2 : Chronologisches verzeichnis der Europischen Schriftsteller über die Syphilis nach ASTRUC, GIRTANNER, HACKER, FUCHS, HENSLER, etc., 22 p. Tokyo, ASAKAYA, 1921.. (Yen 5.00). ISIS

After the expedition to Korea led by the Empress JINGO in the 4th century, there was a series of epidemics of smallpox and measels in Japan. Likewise after she came in contact with the West in the 16th century there was a rapid spread of seemingly a new disease, syphilis. Although some archaeological remains show evidences of syphilis among the primitive Japanese, nothing can be certain. From 1396, however, the Chinese were acquainted with syphilis, and the use of mercury for its cure was known as early as 1557. Between the years 1488-1506, the disease took a heavy toll in and about the city of Canton, and it came to be known as the " Canton sore." Under the entry of 1512 and 1513 in the *Gekkai-sho* and *Myôhôji-ki*, respectively, an epidemic of syphilis in Japan is mentioned under the term " a sore of the Western barbarians." In 1556 when LUIS ALMEIDA (1525-1583) came to the Bungo Province, he established an orphanage and a sanitarium for lepers and syphilitics.

Syphilis first was attributed to the accumulation of bad humor in the body, and a little later to dissipated living. Its highly infectious nature was not discovered till the first of the 17th century. In 1775 SHŌTOKU KAGAWA (1683-1755) concluded that chancre and gonorrhea come from the same disease. In 1820 GENPAKU (1733-1817) translated JOSEPH JACOB PLENCK's *Doctrina de morbis venereis*. Soon LUDWIG TÜRCK's *Richord's Lehre von der Syphilis* was introduced.

The present work includes a brief history of syphilis in the West.

S. S.

Nelson, Nels A.; Crain, Gladys L. Syphilis, gonorrhea, and the public health. XVII+359 p. New York, MACMILLAN, 1938 ($ 3).

ISIS

This is a valuable contribution to the campaign so courageously undertaken by Surgeon General THOMAS PARRAN. The authors insist on the fundamental importance of fighting gonorrhea as thoroughly as syphilis; they realize the great difficulty of the task. In the final chapter after having reviewed the progress accomplished in Scandinavia, they conclude, "The United States starts out facing a problem enormously greater than that which has been so successfully attacked in Scandinavia. It is greater not only in the number of infections, but also because of a tremendous cosmopolitan population, not too respectful of law, not too generally well educated, and served by a not too generally well trained and cooperative medical profession. It behooves us to appreciate, therefore, that nothing less than an herculean effort, guided by common sense, will budge the load." G. S.

52. — HISTORY OF HOSPITALS, OF MEDICAL TEACHING, AND OF THE MEDICAL PROFESSION. BALNEOLOGY, MEDICAL GEOGRAPHY

Martin, Alfred. Die Knappschafts- und die Armenkasse des Nauheimer (Bad-Nauheimer) Salzwerks, *Archiv f. Gesch. d. Med.* 30, 220-46, 1938.

ISIS

Napjus, J.W. De geneeskundige hoogleeraren aan de franeker hoogeschool en het Athenaeum (1585-1843). IX. PHILIPPUS MATTHEUS JUNIOR. *Bijdragen tot de geschiedenis der geneeskunde* 18, 27-34, 1 pl., 1938.

ISIS

Sigerist, Henry E. Socialized medicine. *The Yale review* 463-81, Spring, 1938.

ISIS

Splendid explanation and defense of socialized medicine. G. S.

VIII. — EDUCATION

(The methods of accumulating, imparting and diffusing knowledge)

54. — EDUCATION

(Generalities, methods, colleges, universities)

Boyce, Gray C.; Dawson, W. H. The University of Prague, modern problems of the German University in Czechoslovakia. IX+117 p. London, HALE, 1937. (2/6). ISIS

Well documented story of that venerable and quarrelsome university founded by pope CLEMENT VI in 1347 and by CHARLES IV of Bohemia in 1348. It was the first university established in German lands, but the university hardly functioned before 1360. It was divided into four ill-defined nations : Bohemian, Polish, Bavarian and Saxon. The advent of JOHN HUS (M. A. 1396, dean 1401) put the Czech cause in the foreground, and King WENCESLAS gave the university in 1409 a new constitution, allowing the Bohemian nation to dominate the three others. This caused a general exodus of German students " zu Fuss, zu Pferd und zu Wagen," who helped to establish the new university of Leipzig, and to fortify other German schools at Cologne, Heidelberg, Vienna, Erfurt and Cracow. Further progress of Prague was marred by struggles between Utraquists, Taborites and orthodoxy, and in 1416 the Council of Constance deprived the university of all its rights. In 1555 a new school, the Clementinum, was established by the Jesuits (mostly Belgians and Germans). In 1654, the emperor FERDINAND III combined the old foundation (Carolinum) and the Clementinum to constitute the Carolo-Ferdinandea University. It is not necessary to continue this account. The reader will realize that Germans and Czechs can find in the annals of their university arguments to prove their respective cases, and thus intolerance and misery are allowed to continue. The law of 1920 was made in favor of the Czech and caused much bitterness among the Germans, whose viewpoint the authors reflect. G. S.

Charléty, Sébastien. Les universités de France. *Organon* 2, 79-85, 1938. ISIS

58. — CATALOGUES OF SECOND-HAND BOOKS ON THE HISTORY AND PHILOSOPHY OF SCIENCE

Many catalogues of second-hand books are so interesting and so full of valuable information that we shall henceforth register them in this section, together with other lists of a similar nature, such as catalogues of scientific medals and prints. When applying to the publishers of these catalogues for a copy, please mention *Isis*.

Argosy Book stores. The renowned medical library of ALLEN SALTER, M. D. of Ill. With a few additions. Catalog 119, 71 p. New York, N.Y., 114 East 59th St (received March 1938). ISIS

Davis & Orioli. Recent purchases including a XIIth century Greek manuscript of the New Testament, the 1498 Aldine Greek psalter, a 1517 woodcut Venetian Aesop, DALECHAMPS, Chirurgie françoise, 1573, the first scientific book on botany, ALBERTUS MAGNUS 1517, LOUIS XIV copy of BEAUGRAND's writing book, 1604, Cat. 81, 36 p. London, W. C. 1, 37 Museum St. (received April 1938). ISIS

Goldschmidt, E. P. Bibliography, books about books & libraries, reproductions of manuscripts, palaeography, history of printing, catalogues of libraries, sale catalogues. List 28, 36 p., 328 items. London W. 1, 45 Old Bond St., (received May 1938). ISIS

Goldschmidt, E. P. Old science & medicine. Catalogue 48. 68 p., 228 items. London W. 1, 45 Old Bond St. (received May 1938). ISIS

Goldschmidt, E. P. Philosophy, manuscripts and printed books. Catalogue 47, 89 p., 391 items. London, 45 Old Bond St. (received March 1938). ISIS

Grant, John. Maps and travel, general European travel, oriental literature & history, American history, travel, politics. 58 p., 1641 items. Edingburgh, 31 George IV. Bridge, 1938. ISIS

Heffer, W. Catalogue of books and journals relating to mathematics and physics including aeronautics, astronomy, meteorology, engineering and wireless telegraphy, no. 522, 66 p., 1993 items. Cambridge, Eng., Petty Cury 1938. ISIS

Hirschwald. Alte Medizin und Naturwissenschaften. Antiquariatsliste 126, Geschichte und Bibliographie, 48 p., 426 items. Berlin NW 7, Unter Den Linden 60 (received March 1938). ISIS

Hirschwald. Alte Medizin und Naturwissenschaften, Antiquariats-Liste 126 Nachtrag. Geschichte der Pharmazie und andere Neuerwerbungen zur Geschichte der Medizin. 20 p., 227 items. Berlin NW 7, Unter den Linden, 60 (received April 1938). ISIS

Høst, Andr. Fred. & Søn. Zoology, from the libraries of the late Dr. PHIL. H. J. HANSEN and others. No. 57, 140 p., 3581 items (received Feb. 1938). ISIS

Hoosier Bookshop. Half Americana, half medicine. List 59, 163 items. (Received Feb. 1938). ISIS

Hoosier Bookshop. Medicine, early American text books and other Americana medica, a group of important writings listed by GARRISON as fundamental including a few medical biographies; miscellaneous list 61, 146 items. Indianapolis, Indiana, 2242 Park Ave. (Received April 1938). ISIS

Internationaal antiquariaat. History of medicine (history, autographs, biographies, portraits, etc.). Catalogue no. 90, 38 p., 603 items. Amsterdam, Keizersgracht 610 (received March 1938). ISIS

Kraus, Hans P. Old books on medicine, pharmacology, alchemy and natural sciences mostly from a monasterian library. Catalogue 17, 57 p., 378 items. Vienna, Praterstrasse 17 (received March 1938). ISIS

Lambert, Pierre. Catalogue 22, 1ere partie : livres anciens, rares ou curieux, littérature, histoire, voyages, beaux-arts, etc.; 2e partie : livres, plaquettes rares, documents pour servir à l'histoire des sciences. 57 p., 672 items. Paris VI, chez Durtal, 12 rue Jacob, 1938. ISIS

Lambert, Pierre. Livres, plaquettes rares, documents pour servir à l'histoire des sciences. no. 22, 57 p., 672 items. Paris VI, chez Durtal, 12 rue Jacob, 1938. ISIS

Lier, R. 150 early works on electricity, its medical and technical application, including first editions of GALVANI, VOLTA, and other pioneers of electricity. 153 items. Galluzzo (Firenze), Via S. Felice a Ema, 33, 1938. ISIS

Lier, R. New acquisitions of old medical books. 154 items. Galluzzo (Firenze), via S. Felice a Ema, 33, 1938. ISIS

Nijhoff, Martinus. Astronomy and cosmography before 1800. Second-hand book department, list no. 217, 141 items. The Hague, 9 Lange Voorhout (received March 1938). ISIS

Nijhoff, Martinus. Important and rare books printed between 1477 and 1800 on cosmography, navigation, astronomical and nautical instruments, atlases, sciences, natural history, travels in non-European

countries, interesting for natural history, medicine, dentistry, veterinary science. No. 617, 56 p., 264 items. The Hague, Lange Voorhout 9 (received April 1938). ISIS

Nourry, Émile. Livres anciens et modernes. Le bibliophile français, no. 288, 66 p., 836 items. Paris, 62, rue des écoles, 1938. ISIS

Quaritch, Bernard. The eighteenth century. No. 546, 92 p., 791 items. London W. 1, 11 Grafton St., New Bond St., 1938. ISIS

59. — MEMORIA TECHNICA

Critical bibliography no. 54. *Isis*, vol. 29, 1938. ISIS

This note is published at the end of our bibliography solely for the convenience of the scholars who cut out the whole or part of it, attach extracts to catalogue cards and classify them. By adding this note to the others they will be able to find out rapidly whether this particular bibliography has been analyzed or not.

Isis no. 76 (vol. 28, 1). Bruges, 1938. ISIS

This no. is analyzed in the 54th Critical bibliography. Every previous number has been analyzed in previous bibliographies. G. S.

60. — ERRATA

Si quis Argi oculos habere posset eosque omnes diligentissime ac accuratissime intenderet in singulos versus, multa tamen eum inter corrigendum effugerent.

ISIS

Vol. 28, 131. Read O. A. DOBIASH, not N. A.

173. Note SUDHOFF. The word melhor should be printed in ordinary type.

228. Note WILHELM, GUNDEL. Read instead GUNDEL, WILHELM (make corresponding correction in the index, cancelling WILHELM, and adding GUNDEL, W., 4.

A few other misprints are not mentioned in these errata because they are too obvious to cause any error or confusion. I wish to express my thankfulness to the readers who take the trouble to make the above-mentioned corrections in their set of *Isis* and the *Introduction*. I would advise them, after having accomplished that little task, to write their initials near mine at the bottom of this note to indicate that these and previous errata have been taken into account. G. S.

These and the previous errata have been corrected by.....

Index of Authors Included in the Fifty-fourth Bibliography

The Roman figures followed by (1) or (2) refer to the centurial classification (Part I); thus Aebischer, P., XIV(2) means that a paper by Aebischer is listed under fourteenth century, second half.

The Arabic figures refer to the historical and to the systematic classification (Parts II and III) which are subdivided in sections numbered consecutively from 1 to 60. For instance, Abbott, N., 14 indicates that a paper by Abbott is listed in section 14 (Islam); Åberg, N., 39 indicates that a paper by Åberg is listed in section 39 (Prehistory).

June 1938. FRANCES SIEGEL.

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